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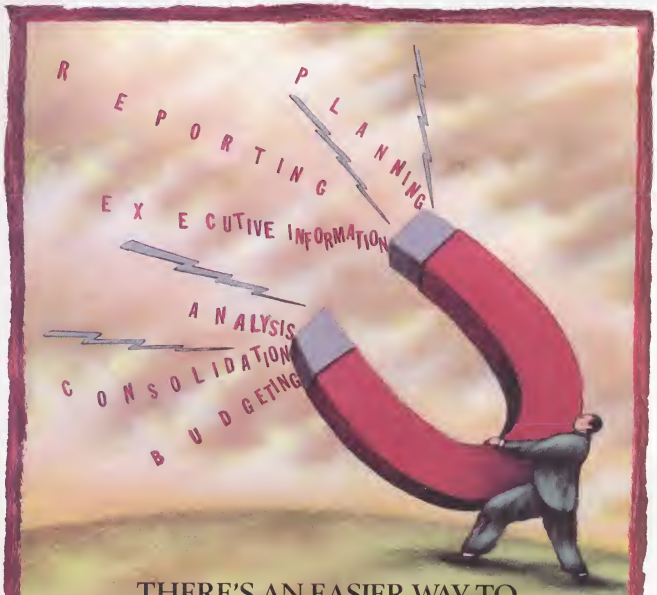

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VOLUME 7

LOTUS

NUMBER 7

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70 *Microsoft's souped-up, slimmed-down DOS is a memory hog no more.*

This symbol indicates that the model in this article is available on-disk. To order, send a check or money order for $19.95 to Lotus Publishing Corp., July 1991 Issue Disk, P.O. Box 1165, Kendall Square, Cambridge, MA 02142. Indicate the size of the disk (3 1/2-inch or 5 1/4-inch) you want.

28 *In occupied Kuwait, 1-2-3 helped a group of westerners in hiding track their food and supplies while Iraqi soldiers patrolled nearby.*

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CIRCLE 102 ON READER SERVICE CARD

THIS REVOLUTION IS FOR REAL

Remember the revolution of '89?

It had been rumored for months. Release 3, the dramatic new *1-2-3* upgrade that had been simmering for years, was coming. No one knew exactly when, but it would certainly change the spreadsheet realm forever.

It turned out to be the kind of revolution that Marie Antoinette could have lived with. Release 3 rumbled onto the scene with a garish bit-mapped screen, virtually no spreadsheet-publishing capability, and calculations so slow that you could watch them unfold before your eyes.

When the smoke had cleared–and it didn't take long–it was apparent that the new *1-2-3*'s only real claim to supremacy was the 3-D spreadsheet. While this feature may have set corporate comptrollers dancing in the streets, it didn't inspire the rest of the world. Release 2.2, the speedy 2-D upgrade that shipped a month later, quickly quashed the pretender's shaky reign, racking up an enormous sales advantage. Oddball Release 3 enhancements such as the Printer Encoded command just didn't qualify as history in the making.

Now there's another movement afoot. With *Microsoft Windows* laying siege to DOS, and Apple unleashing countless cut-rate Macintoshes, Lotus Development Corp. has concluded that it's the GUI environment, not external database drivers, that will foment upheaval in the spreadsheet world. Accordingly, the company seems intent upon pushing the graphical interface (if not the spreadsheet itself) to its logical limit in its forthcoming *Windows* and Macintosh spreadsheets.

This time Lotus may be backing a legitimate successor–or two. The innovations in its GUI products really do promote a new world order by making the spreadsheet more productive–and more fun. Spreadsheet publishing takes place right in the worksheet, not with add-ins and clunky double-menu systems. Palettes of homemade icons can follow you around the screen. Graph selections expand beyond the tired quintet that has dominated every *1-2-3* release since 1A. And you can create graceful macros without typing a single curly bracket. Is this the arsenal that will finally sway the masses from their allegiance to the aging *2.x* product line? The answer has to be yes. With CPUs ticking ever faster, time is no ally of the *ancien régime*.

Kelly R. Conatser
Contributing Editor

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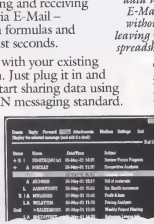

While in your spreadsheet, you'll be alerted whenever new E-Mail arrives. Then, in a couple of keystrokes, access your "inbox" and instantly start working with any spreadsheet data you've received.

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6. Send only the data you want to send by simply "painting" a range into a message – even to non-spreadsheet users. No re-keying ever!

7. Launch directly into your spreadsheets as soon as you receive them – without exiting @Mail.

8. Create macros to send E-Mail messages triggered by spreadsheet results. (Automatically re-order an item when on-hand quantities fall below a minimum point. Or send a "job well done" memo when sales reps meet their quotas. Or produce other *data-driven messages.*)

9. Send confidential spreadsheet information in complete privacy using password protection.

10. Did your data get there? Was it read? With "return receipt requested," you can always be sure.

11. Efficiently send spreadsheet data using distribution lists to a predefined group of people.

@Mail Requirements: Requires MHS Network version 1.1 or higher. Operates on all Intel™-based PCs (recommended minimum is 80286). Requires DOS 3.1 or higher. Requires 640K (uses LIMS EMS release 3.2 or later). Supports Novell ELS™ version 2.15 or higher, or Advanced NetWare™ 286/386 version 2.15 or higher installation. Remote access supported through Personal MHS 1.1 or higher. @Mail requires 120K RAM above 1-2-3.

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CIRCLE 103 ON READER SERVICE CARD

New Books on Lotus Software for Windows

The most intensive software development effort ever mounted by Lotus Development Corp. is now bearing fruit. New *Windows* products–*1-2-3 for Windows*, *Lotus Freelance Graphics for Windows*, *Lotus Notes* 2.0, *Ami Pro* 2.0–as well as *1-2-3 for Macintosh*, are nearly ready to go.

Lotus Books has been equally busy. You'll soon find titles with in-depth explanations and practical applications for new Lotus software. Our list includes:

The Lotus Guide to 1-2-3 for Windows, by Justin Fielding. Justin, formerly a senior editor at *LOTUS*, is now a manager in Lotus's spreadsheet design group. He explains not only how to get the most from *1-2-3 for Windows*, but also how to use *Windows* itself. In the foreword, Frank King, Lotus's senior vice president of software development, maps out some key decisions along the *1-2-3 for Windows* development path.

Business Writing with Ami Pro, by Mark Scapicchio. Mark was formerly the reviews editor at *LOTUS* magazine and is a contributing editor to *The Ami Pro Report*, a forthcoming Lotus Newsletter. You'll also hear from Bill Jones, the development manager for *Ami Pro*, who tells some insider stories about the development of this award-winning *Windows* word processor.

Lotus Notes at Work, by David and Sally DeJean. The authors have been working closely with the creator of *Notes*, Ray Ozzie, to develop a book that captures the innovative spirit of Lotus's first groupware product. (Ray also supplies the book's foreword.) The DeJeans confront the critical issues of enterprise-wide computing–a strategic topic for business in the nineties–through extensive interviews with many of the early adopters of *Notes*.

1-2-3 for Macintosh, by Kelly R. Conatser. Kelly, a contributing editor to *LOTUS*, is a business-applications expert. In fact, the product-development team at Lotus has included a selection of his templates in the *1-2-3 for Macintosh* package. In the foreword, Rob Adams, the Macintosh product's marketing manager, describes how the close working relationship between Lotus and Apple resulted in some significant enhancements to the design of *1-2-3 for Macintosh*.

Look for announcements of these books in *LOTUS* magazine. If you have any comments about Lotus Books or about what you'd like to see in them, please write us, care of Lotus Books.

Susan Hunt
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Brady Books

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CIRCLE 104 ON READER SERVICE CARD

CORRECTING ASSUMPTIONS

I found a flaw in "Sensitivity Training" [May, page 40]. If low value represents a worst-case scenario and high value represents a best-case scenario, then the unit-cost values are incorrect. Unit cost for the worst case should be the highest value that is normally associated with less-than-ideal operations. Correctly substituting the higher unit cost in the *Low Value* analysis column would significantly change the outcome and perhaps the decision that results from using the model.

Rick Blackburn
Pennsylvania Institute of Technology
Media, Pa.

The editor replies: The basic sensitivity macro (\s) simply calculates a range of outcomes associated with the highest and lowest values of each variable, with all other variables held equal. Therefore, it doesn't matter whether the low value is a best-case or a worst-case figure.

The \c macro, however, calculates a range of outcomes with a positive correlation between two or more variables. Therefore, if you are looking for the worst-case or best-case scenario, you must enter all worst-case values in one column and all best-case values in the other column, as you suggest.

@NPV OOPS!

Although author Larry Roshfeld correctly chose the @NPV function to solve Challenge 5 in "Take the @Function Challenge" [April, page 36], he incorrectly applied it. Net present value is defined as the sum of all cash flows discounted to their present value at year 0. The @NPV formula assumes that all cash flows occur at the end of the year. Therefore, you should not include the initial loan amount—in this case, $5,000—in the range of cash flows. Instead, you should add the $5,000 to the value returned by the @NPV function.

The correct formula for cell B44 is @NPV(0.09,B35..B40)+B34, which calculates a net present value of $678.45 for plan 1. The correct formula for cell C44 is @NPV(0.09,C35..C40), which calculates a net present value of $522.43 for plan 2. Plan 1 is still better.

Steve Palandri
Nebraska Public Power District
York, Neb.

The editor replies: Thanks to all the readers who wrote to us about the error in Challenge 5. In the original manuscript, Larry Roshfeld correctly used the @NPV function to calculate net present values. The error was introduced during editing.

NO LONG TITLES

"Take the @Function Challenge" is a good way to brush up on techniques I use in my spreadsheets. However, the formula you present as the solution to Challenge 2 cannot handle a title longer than 4 characters or a last name longer than 50 characters. For example, your formula cannot properly handle a label with the title *Ambassador*.

The following formula can handle titles and last names of any length:

```
@RIGHT(A9,@LENGTH(A9)-@FIND
(" ",A9,@FIND(" ",A9,0)+1)-1)
```

John Joseph Brizek
Fair Lawn, N.J

FREEZE 'EM

I was surprised to discover that your solutions for Challenges 1 and 2 in "Take the @Function Challenge" didn't use the Range Value command to wrap up the procedures.

In Challenge 1 you're left with a column of @DATEVALUE formulas. In Challenge 2 you're left with a column of @MID formulas. If you erase the original column of data in both cases, the formulas return erroneous results, but you can use the Range Value command to "freeze" the results of the formulas. Doing so creates columns of dates and last names that you can sort, separate, move, import, export, and so on, all without wondering where

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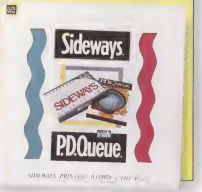

FUNK SOFT WARE

FOR 1-2-3 RELEASE 2 AND SYMPHONY.

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CIRCLE 105 ON READER SERVICE CARD

your original column of data went.

To use the Range Value command, select /Range Value (in *Symphony*, MENU Range Value). The prompt *Enter range to copy FROM* appears. Specify the range containing the formulas you wish to convert. For Challenge 1, specify range B2..B5; for Challenge 2, specify range C9..C12. At the prompt *Enter range to copy TO*, specify that range again. The current values replace the formulas.

James E. Foley
Image Entertainment Inc.
Chatsworth, Calif.

A NOTE FOR SYMPHONY USERS

Please consider using a musical note or some other icon to designate articles that apply to *Symphony*, or at least make it clear when your articles are not for *Symphony* users. I often want to use your suggestions but find that they don't work in *Symphony*.

John G. Kerr
Dallas, Tex.

The editor replies: You can determine which products and releases a model works in by turning to step 1 in the setup box at the end of application articles. We will, however, consider your suggestion.

TALK IS NOT SO CHEAP

The article on inexpensive voice-recognition products ["Talk is Cheap," April, page 32] is good, but the more-sophisticated and expensive products deserve some attention, too. I am a quadriplegic and I use DragonDictate-30K, from Dragon Systems of Newton, Mass. It is one of the higher-priced systems that is well worth the cost.

Kenneth R. LeBrun
Technology for the Handicapped Fund
Franklin, Mass.

ERR

In "1-2-3's New Releases: A Double Feature" (May, page 34), we incorrectly claimed that *Allways* "supports landscape printing on dot-matrix impact printers." You can print in landscape mode on dot-matrix machines using Funk Software's *Sideways* add-in, but *Sideways* cannot print spreadsheets enhanced with *Allways*.

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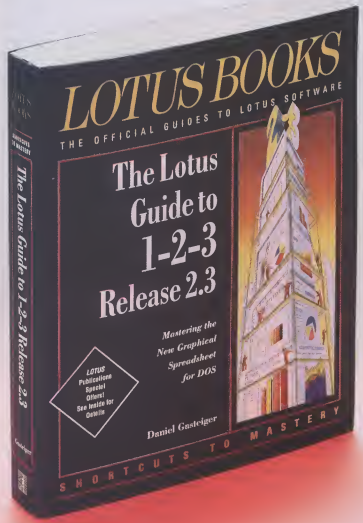

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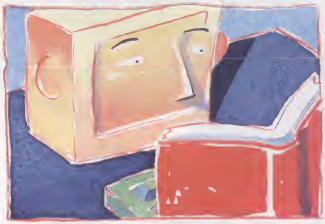
Add a Few Points to Your PC's IQ

Neural-network programs simulate human deductive reasoning.



Two years ago, Connecticut currency trader James O'Sullivan bought some new software, one of a new class of brainy programs known as neural networks. He stuffed the software full of historical data about inflation, money supply, interest rates, and currency prices. Then he entered the current economic indicators. The system rewarded him with straightforward advice: Buy yen. Sell marks. Hold dollars.

"The results are superior," says British-born O'Sullivan, who religiously applies the neural network's recommendations to one portfolio. "I'm not saying what I've got is perfect, but it does seem to work."

What O'Sullivan's got is *Brainmaker*, from California Scientific Software in Grass Valley, Calif. It was one of the first of a growing number of neural-network packages available for PCs.

Originally, neural networks were envisioned as a computer imitation of the human brain's web of interconnected neurons, using thousands of processors operating simultaneously in a massively parallel structure. Such hardware has proven difficult and expensive to design, however, and in recent years, software developers have devised simulated neural networks using a newly discovered algorithm called back-propagation. This algorithm compares the relation between various inputs and outputs through a process of trial and error.

Make your own rules. Neural networks are good at the things that have traditionally tripped up computers: making associations and generalizations, drawing inferences, recognizing patterns, and disregarding errors. Unlike expert systems and other conventional rule-based programs, neural-net software does not need to be preprogrammed to consider every conceivable aspect of a problem. Instead, users "train" neural networks by filling them with massive amounts of data. The programs make exhaustive comparisons of the relationships among the data and arrive at their own rules.

> UNLIKE EXPERT SYSTEMS, NEURAL-NETWORK PROGRAMS ARRIVE AT THEIR OWN RULES.

The result is applications that are eerily similar to human behavior. Gerald Tesauro, a staff member at the IBM Research Center in Yorktown, N.Y., trained a neural network to play backgammon by showing it thousands of random moves. Unlike chess, which is rule-based, "backgammon relies more heavily on judgment than it does on search," says Tesauro, who constructed his game on a Unix-based workstation. "Chess programs rely on massive, brute-force search programs that project various options into the future. But they don't have to be very smart." When the training was over, Tesauro's computer could respond to moves it had never before encountered. In fact, it blew away all commercial backgammon programs.

Not everyone has had as much success. William H. Harder, a Los Angeles sales representative for Quotron Systems, says he achieved only mixed results predicting stock market indexes with *Braincel*, a neural-net add-in for *Microsoft Excel* 3.0 from Promised Land Technology (New Haven, Conn.). On the other hand, Harder may simply be keeping a good thing to himself. "If it does work, I guarantee you won't know about it," he says. "I'll be using it myself."

Many companies have had significant success with neural networks. Chase Manhattan Bank, for example, has begun to train neural nets to make initial assessments of loan applicants. "Banks and

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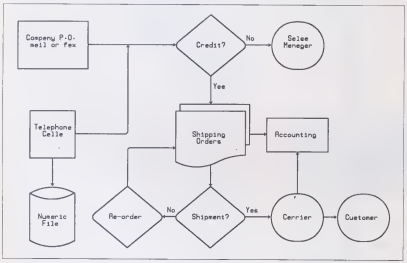

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insurance companies are getting 3%, 4%, and 5% improvements," says Steven J. Weaver, a senior scientist at Computer Sciences Corp. in Laurel, Md. "That's literally money in the bank when you're lending out hundreds of millions."

Using *Neural Works* from NeuralWare Inc. of Pittsburgh, Weaver recently devised a neural network for a more astronomical task: diagnosing problems in the trajectory of the Gamma Ray Observatory, which was launched in April from the space shuttle *Atlantis*.

From soup to nuts. The possible applications are virtually limitless. The Defense Department has poured millions of dollars into classified systems that identify targets for fighter aircraft or submarines. On a simpler scale, Sumitomo Heavy Industries in Japan has created a system—based on *ExploreNet 3000* from HNC Inc. in San Diego—that can distinguish subtle differences in apples streaming down a conveyor belt. At a rate of 40 apples per second, the machine counts and evaluates defects before deciding how to grade each piece of fruit.

The Ford Motor Co. is working on a neural-net application that "listens" to a stream of data from a car's microprocessors the way an expert mechanic might listen to an engine's purr. "Long term, it looks like a ripe area for on-board diagnostics," says Lee Feldkamp, a Ford researcher. "Near term, we're probably talking about diagnostics at the end of the production line or at the dealer."

Jumping headlong into this market, a small stampede of software vendors have sold about 40,000 neural networks in the last two years, according to Tom Schwartz, head of The Schwartz Associates in Mountain View, Calif.

NeuralWare, which calls itself the in-

INTERNATIONAL CONFERENCE

The International Joint Conference on Neural Networks takes place July 8 through 12 in Seattle, sponsored by the IEEE (Institute of Electrical and Electronics Engineers) and the International Neural Network Society. To register, call 206-543-2310. To order a copy of the proceedings, call IEEE customer service at 800-678-IEEE.

CIRCLE 107 ON READER SERVICE CARD

dustry sales leader, sells several versions of *Neural Works* at prices starting at $1,895. California Scientific Software sells *Brainmaker* for $195 and a professional version for $795. Prices for HNC's *ExploreNet 3000* range from $600 to $1,500. Science Applications International Corp. (San Diego) sells a neural-net program called *Ansim* for $495. Neurix (Boston) sells a $1,495 Macintosh package called *MacBrain*. And Murray Ruggiero, Promised Land Technology's vice president, says his company may adapt *Braincel*, the $250 *Excel* add-in, to run with other applications.

Most of the vendors say their products can import *1-2-3* files. The cheaper versions can process only smaller files and lack some of the features of more advanced versions, such as C compilers, which let users embed the neural network in another application. Some of the packages come with proprietary accelerator boards or math coprocessors to speed up the training process.

But even with a math coprocessor, nearly everyone who has used a neural net cautions against expecting instant results. The programs take time to set up, and training neural-network software on a complex data set can tie up even the most powerful desktop machines for the weekend.

And after that, it may take time to learn to trust the results. "Neural networks are not for the dilettante," confirms O'Sullivan, the currency trader. "It took me a good year to develop enough comfort and security to commit my capital."

—*Andrew Maykuth*

MULTIMEDIA UPDATE

The technology is still too expensive for widespread business use.

Multimedia. Not since the early days of the "connectivity" craze has a computer industry buzzword encompassed so much, fascinated so many, and affected so few. But a spate of recent announcements by such major industry players as Microsoft Corp., IBM, and Tandy Corp. could bring the fuzzy multimedia picture into focus and eventually

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The term *multimedia* eludes definition because multimedia takes so many forms and because it continues to evolve. Essentially, however, it is the merger of computer technology with high-quality audio and video capabilities. Video alone can take a variety of forms, including computer-generated images and animation, as well as digitized still pictures and full-motion video sequences drawn from CD-ROMs or videodiscs.

The standards battle. This convergence of media can yield highly persuasive business presentations and engaging, interactive educational and training programs. So far, however, it's yielded more clamor and confusion than breakthroughs. With little coordination and few standards to guide them, most producers of multimedia hardware and software are going their own separate ways. The Macintosh, with its mature graphical interface and the allegiance of many artistic professionals, has been the proving ground and preferred platform for most multimedia efforts to date, particularly because most PCs are ill-equipped to handle either the creation or delivery of multimedia projects.

But that may be changing. Microsoft has promised by mid-year a new version of *Windows* that includes support for optical storage devices (such as CD-ROM and videodisc), plus a number of multimedia hardware products, including audio-capture and full-motion video adapters from IBM and others. IBM says it plans to incorporate similar extensions into the OS/2 operating system. More broadly, IBM and Microsoft have agreed on a set of multimedia specifications that

'PEOPLE ARE AFRAID TO USE MORE THAN TWO COLORS IN A SLIDE.'

govern the way data is stored and media devices are controlled, providing some badly needed common ground for software developers.

Many of the current authoring or "scripting" programs for the PC have

been, or soon will be, adapted to support the new multimedia specifications and *Windows* extensions. These programs include *IconAuthor* ($1,095, from AimTech Corp., Nashua, N.H.), *ToolBook* ($395, from Asymetrix Corp., Bellevue, Wash.), *Professional for Windows* ($8,000, from Authorware, Minneapolis), and *Animator* and *3D Studio* ($395 and $2,995, respectively, from Autodesk, Sausalito, Calif.). It's not clear when we're likely to see multimedia efforts that take full advantage of the *Windows* extensions, nor whether they'll substantially improve or simplify the creative process. But interest in multimedia, or more specifically, its promise, is high.

"There's something real happening here," notes Nick Arnett, president of Multimedia Computing Corp., a Santa Clara, Calif., market research firm and newsletter publisher that specializes in the subject.

A multimedia machine. Hardware makers are clearly interested in multimedia, too. A coalition of major computer companies led by Tandy agreed on a minimum configuration for multimedia PCs: a fast '286 or '386 system with 2 megabytes of memory, a 30-megabyte hard disk, a CD-ROM drive, VGA graphics, digital-audio capabilities, and the *Windows* multimedia interface.

Tandy was the first to market with a line of so-called multimedia computers. The systems, from a 16MHz '286 with 2 megabytes of RAM to a 33MHz '386 with 4 megabytes, range in price from $2,600 to $5,500 and come with a Super VGA display subsystem and Photo CD, Eastman Kodak's technology for storing 35mm photographic images on writable CD-ROMs.

Zenith, NEC, CompuAdd, AT&T, Olivetti, and Fujitsu have also pledged to deliver multimedia machines this year. IBM refrained from making such a commitment, saying it has not yet decided what form a multimedia PC should take.

The emergence of multimedia standards has also sparked interest among add-on makers in upgrading existing PCs with CD-ROM drives and improved audio and video capabilities. Tandy has already shipped upgrade kits for '286 and '386 systems; Headland Technology (Fremont, Calif.), Creative Labs (San Francisco), and Media Vision (Fremont, Calif.) have each announced forthcoming multimedia upgrade kits, for example.

But these machines, analysts caution, are principally delivery systems. The creative workstations needed to produce high-quality presentations or training materials will likely remain in the $10,000 to $20,000 range for some time and require expertise to operate.

"We can't even sell people machines for making 35mm slides at their desks, so I can't see a lot of people having multimedia authoring systems on their desks," notes Paul Saffo, a research fellow who tracks emerging technologies at the Institute for the Future in Menlo Park, Calif. "But there are some interesting niches."

For business, those niches are mainly high-powered presentations, interactive training courses, and process-visualization techniques for scientific and engineering applications. And there are already multimedia success stories. Slick presentations by the Atlanta Organizing Committee helped the city win the 1996 summer Olympic games. Bethlehem Steel cut training time and production slowdowns substantially by using a computer and videodisc system. The Sigel Group, a Philadelphia architectural and engineering firm, uses a multimedia ensemble to

PAUL SCHULENBURG

illustrate complex jobs.

Too much, too soon. Still, few analysts believe multimedia is easy enough or cheap enough to appeal to the average business user just yet. "In a world that hasn't yet adopted presentation graphics to the degree that it has adopted other applications, there are not a lot of people ready to do multimedia," says William Coggshall, president of New Media Research (formerly Desktop Presentations Inc.), a market research firm in Los Altos, Calif. "You're talking about spending days and days [working] with this stuff."

Graphics professionals who work closely with corporate customers agree. "The technology is way ahead of where most people are right now with presentation graphics," says Jerry Cahn, president of Brilliant Image, a New York company that creates presentation materials for business clients. "Lots of people are afraid of using more than two colors in a slide."

In the near term, at least, more modest multimedia efforts may gain broader acceptance in the business world. Adding relatively simple audio, imaging, and motion effects to such well-known graphics packages as *Harvard Graphics*, *Lotus Freelance*, and *PowerPoint*, for example, could be the route by which most business users become acquainted with multimedia. Prefabricated audio and video sequences, similar to the graphing templates now included with most presentation programs, could make the transition even easier.

"A full-blown multimedia presentation is a hell of a commitment," notes Ed Clark, manager of information systems at Dow Plastics in Midland, Mich., a veteran producer of one such elaborate presentation. "Something like an on-screen slide show with some movement may be pretty low-tech by comparison, but it works, and it's a project more users can manage at this point."

Indeed, the gap between the expectations raised by new products and the capabilities that users can realistically manage or afford may be a difficult one to bridge in the coming months and years.

As the chief executive of one major computer manufacturer lamented privately to Arnett: "I wish we could put multimedia back in the closet for about three years so we could develop the kinds of products people think are just around the corner." —*Christopher O'Malley*

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CIRCLE 193 ON READER SERVICE CARD

Hey, Good Lookin'

Spruce up your output with the Worksheet Column Set-Width and Range Format commands.

BY KELLY R. CONATSER

The data you enter into a worksheet doesn't always look the way it should. Sometimes long labels are truncated by other entries. Other times dollar amounts are packed into a cell in a format that makes them nearly impossible to recognize.

1-2-3 provides several formatting commands and utilities to demystify incomprehensible worksheets. Two of the most important commands are Worksheet Column Set-Width and Range Format. This month we'll show you how to set column widths and assign the Currency format to a range of worksheet cells. After you learn the basics, experiment with column widths and try other cell formats on the data in your own worksheets to find the combinations that present your data in the clearest, most appealing way.

If you built and saved last month's worksheet, retrieve it. Start *1-2-3* and press the slash key (/) to call the main menu. Select File Retrieve. If necessary, use the Backspace key to edit the path name that *1-2-3* displays after the prompt *Name of file to retrieve* so that *1-2-3* looks in the drive and directory where you saved the file. Enter *first*, which is the name of the file.

To create the model from scratch, start *1-2-3* and enter the labels in ranges B1..F1, A2..A3, and A5 of figure 1. Enter the numbers in range B2..E3. Enter the formula @SUM(B2..E2) in cell F2. Then press the slash key to call *1-2-3*'s menu, and select Copy. *1-2-3* displays the prompt *Enter range to copy FROM: F2..F2*. Press Return, and *1-2-3* displays the prompt *Enter range to copy TO: F2*. Move the cell pointer to cell F3 and press Return. Enter the formula +B2+B3 in cell B5. Select /Copy and specify cell B5 as the range to copy from and specify range C5..F5 as the range to copy to. Finally, select /File Save and enter *first* to save the file.

A LINE IN THE SAND

Row 4 of the worksheet in figure 1 separates the bottle and can data in rows 2 and 3 from the totals in row 5. Many worksheets use a repeating label—often a dashed line—instead of a blank row to separate sections of a model.

To create a repeating label, use the backslash key. It's easy to confuse the backslash key (\) with the slash key (/). If you press the wrong one, you'll know immediately because *1-2-3* will display the menu rather than a slash on the edit line. If you accidentally press the slash key, press Escape to return *1-2-3* to READY mode, and then try again.

To create a dashed line to separate the data and totals in this worksheet, move the cell pointer to cell A4. Press the backslash key, then the hyphen key. The entry \- appears on the edit line. Press Return, and *1-2-3* automatically enters as many hyphens as necessary to fill cell A4—in this case, nine. Copy the label in cell A4 to range B4..F4. The range fills with a dashed line.

Create a few more repeating labels. Move the cell pointer to an out-of-the-way area of the worksheet—cell R1, for example—and enter a backslash and an equal sign (\=), a backslash and the letter X (\X), or a backslash and your initials.

WIDENING COLUMNS

In a blank *1-2-3* worksheet, the default column width is 9. So far, each entry you've made fits neatly into a nine-character-wide cell. When an entry contains more than nine characters, you need to adjust the column width so that the entire entry is visible in the cell.

Use the Worksheet Column Set-Width command to widen or narrow a column. To see how this command works, let's add an additional row of formulas to the worksheet.

Suppose that the data in the worksheet pertains to truckloads of bottles and cans and that you receive $100 for each truckload you collect. How much revenue can you expect from the totals displayed in the worksheet?

To calculate this amount, create a formula that multiplies the total in cell B5 by $100. Move the cell pointer to cell B7 and enter the formula +B5*100. The formula returns *15000*, the total amount you'll receive for the bottles and cans collected in the eastern region.

To calculate the revenue for the other regions, as well

	A	B	C	D	E	F	G	H
1		Eastern	Western	Southern	Northern	Totals		
2	Bottles	100	100	100	25	325		
3	Cans	50	75	75	50	250		
4								
5	Total	150	175	175	75	575		

Figure 1. Basic data for a bottle-and-can-collecting business.

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as the total revenue, copy the formula in cell B7 to range C7..F7. Select /Copy, specify cell B7 as the range to copy from, and specify range C7..F7 as the range to copy to. *1-2-3* calculates the total revenue for each region, as well as the total for all regions.

Now you need a label that describes the calculations. Move the cell pointer to cell A7 and enter the label *Total revenue*, as shown in figure 2. *1-2-3* enters the label in cell A7–or does it? All you see in the cell are the first nine characters, *Total rev*. However, the current-cell indicator in the upper-left corner of the screen tells the whole story. It reads *A7: 'Total revenue*, meaning that *1-2-3* did indeed enter the entire label into cell A7.

To display all 13 characters, widen column A. Select /Worksheet Column Set-Width. *1-2-3* displays the prompt *Enter column width (1..240): 9*, which means that you can set column A to any width from 1 to 240 characters and that the current column width is 9 characters.

You can respond to this prompt in two ways. If you know exactly the column width you want, enter a number. For example (but don't do this now), to widen column A to 15 characters, you would type *15* and press Return. However, if you're not sure how wide the column should be, use the Arrow keys to adjust the width one character at a time. The RightArrow key widens the column, and the LeftArrow key narrows it. Each time you press an Arrow key, *1-2-3* adjusts the column width so that you can see the effect of a particular width.

Try this now. Press the RightArrow key once. *1-2-3* widens column A of the worksheet to 10 characters, and the label in cell A7 reads *Total reve*. The prompt in the control panel also reflects the new column width.

Press the RightArrow key five more times. With a column width of 15, the label in cell A7 is now fully visible, with two characters to spare. Press the LeftArrow key once to narrow column A to a width of 14 characters, and press Return. *1-2-3* sets the width of column A to 14 characters and returns to READY mode.

MAKE DOLLARS AND CENTS

The formulas in row 7 tell the revenue story of the bottle-and-can-collecting business, but not in a very informative way. Because the numbers represent dollar amounts, it would be better to display them that way.

To change the way a value or the result of a formula appears in the worksheet, use the Range Format command. Move the cell pointer to cell B7 and select /Range Format. *1-2-3* displays a menu of formats, including scientific notation and percentages.

Select Currency from the Range Format menu. *1-2-3* responds with the prompt *Enter number of decimal places (0..15): 2*. This prompt indicates that you can format a cell to display a number with Ø to 15 decimal places and that the default display for the Currency format is 2 decimal places.

Type Ø and press Return to specify a Currency format with zero decimal places. *1-2-3* presents the prompt *Enter range to format: B7..B7*. Press the RightArrow key four times to highlight range B7..F7 and then press Return. The numbers in the range now appear in a more familiar format, with dollar signs and commas.

FITTING FORMATS

Suppose you want to display the total-revenue figures in row 7 down to the penny. Use the Currency format with two decimal places instead of none. To do so, select /Range Format Currency. When *1-2-3* presents the prompt *Enter number of decimal places (0..15): 2*, press Return to accept the default value of 2. Then specify range B7..F7 as the range to format and press Return.

Horror of horrors! Your calculations seem to have turned to asterisks. But fear not. The formatted values are simply too wide for *1-2-3* to display in the current column width. Instead of presenting truncated numbers, which you might misinterpret, *1-2-3* fills the cells with asterisks.

To display the revenue totals in their new format, widen columns B, C, D, E, and F. If you use *1-2-3* Release 2.01, move the cell pointer to any cell in the column you want to widen and select /Worksheet Column Set-Width. *1-2-3* displays the prompt *Enter column width*. Enter *11*. Repeat this process for each column you want to widen.

If you use *1-2-3* Releases 2.2/2.3/3.x, one command will set the width of a range of columns. Select /Worksheet Column Column-Range Set-Width. When *1-2-3* prompts *Enter range for column width change: B7..B7*, press the RightArrow key four times and press Return to specify range B7..F7. *1-2-3* prompts you to specify the width for these columns. Press the RightArrow key twice. *1-2-3* adjusts the widths of columns B, C, D, E, and F to 11 characters. Press Return to select this column width.

Your worksheet should look like the one shown in figure 2. Save this file so that you can work with it next month. Select /File Save and press Return to select the file name FIRST. Then select Replace to overwrite the old file with this expanded, formatted edition.

Kelly R. Conatser is a contributing editor to *LOTUS* and author of *Spreadsheets for Small Business*, a forthcoming title in the Lotus Books series from Brady Books, a division of Simon & Schuster.

	A	B	C	D	E	F
1		Eastern	Western	Southern	Northern	Totals
2	Bottles	100	100	100	25	325
3	Cans	50	75	75	50	250
4						
5	Total	150	175	175	75	575
6						
7	Total revenue	$15,000.00	$17,500.00	$17,500.00	$7,500.00	$57,500.00

Figure 2. The Currency format and wider columns enhance the model.

The Evolving Macro

When to use self-modifying macros, and when to choose a different approach.

Self-modifying macros add flexibility and speed to your macros. They change their own code while they run, and incorporate and act on data provided by the user or by the macro itself. The resulting task varies according to the modified instructions.

Although changes made to *1-2-3* after Release 2.2 eliminate the need to use self-modifying commands in many cases, the technique is still handy when you work in *1-2-3* Release 2.01 or when you must share macros with someone who is using that release. In any release, self-modifying macros can speed up applications that require variable changes within a loop—such as a routine that looks up a list of names in a lookup table.

Macros that rewrite themselves can take instructions from an ASCII file, write them to a range, and then incorporate the new commands into the macro during execution. They could, for example, update a file-name or range-name reference within a command to perform tasks across multiple files or to draw in rarely used routines from other files.

Self-modifying macros may not always be the best approach, especially in later releases. It may be helpful to look at four common uses for self-modifying macros, as well as their alternatives.

PASTING LABELS

Suppose that you want to distinguish the rush orders in a daily order list but don't want to retype the word *rush!* next to each and every rush order. In *1-2-3* Releases 2.2 and later, you can use the macro shown in figure 1 to enter the label *rush!* in the current cell.

	A	B	C	D	E	F
1	Order No.	Qty				
2	----------					
3	1	15 rush!				
4	2	20				
5	3	100 rush!				
6	4	38				
7	5	25				
8	6	26				
9	7	12 rush!				
10						
11	\g	{LET @CELLPOINTER("address"),"rush!"}~				

Figure 1. The newer releases of *1-2-3* let you include a variety of @functions as arguments. Here, the {LET} command enters *rush!* in the current cell.

To create this macro, enter the labels and values in columns A and B. Begin the entry in cell A11 with an apostrophe. Use the Range Name Labels Right command to assign the label in cell A11 as the range name for the adjacent cell in column B. Place the cell pointer in cell C3. Then hold down the MACRO key (Alt on most computers) and press G. The following command enters the label *rush!* in the current cell:

{LET @CELLPOINTER("address"),"rush!" }~

The figure shows the result of running the macro with the cell pointer in cell C5 and then in cell C9.

If you use *1-2-3* Release 2.01 or earlier, you can't get *rush!* into the current cell so easily. That's because the earlier releases of *1-2-3* aren't as good at interpreting @functions used as arguments in macro commands. If you run this macro in earlier releases, you will get the error message *Macro: Invalid range in LET (B11).*

Figure 2 shows a macro that works in earlier releases. It is functionally equivalent to the macro in figure 1, but it uses a string formula rather than an @function. To see how it works, enter the labels as shown, omitting the text in cell B14. Use the Range Name Labels Right command to assign the labels in range A13..A14 as range names for the adjacent cells in column B. Finally, enter the following string formula in cell B14:

+"{LET "&@CELLPOINTER("address")
&","rush!"}~"

Run the macro by pressing MACRO-A. It calculates the current address of the cell pointer and embeds that information in the string formula to create what *1-2-3* Release 2.01 interprets as a valid macro command.

	A	B	C
13	\a	{RECALC aaa}	
14	aaa	{LET $B$14,"rush!"}~	

Figure 2. In *1-2-3* Release 2.01, you must use a string formula to create the functional equivalent of the macro shown in figure 1. The macro is harder to read, but it runs a little faster.

Even though both macros incorporate variable information into a command, only the second qualifies as

LOTUS

The models described in this article are available on disk. See page 1 for details.

```
\c      {}
crazy   {DOWN}
        {IF crazy="{UP}"}{LET crazy,"{RIGHT}"}{BRANCH crazy}
        {IF crazy="{LEFT}"}{LET crazy,"{UP}"}
        {IF crazy="{DOWN}"}{LET crazy,"{LEFT}"}
        {IF crazy="{RIGHT}"}{LET crazy,"{DOWN}"}
        {BRANCH crazy}
```

Figure 3. This macro moves the cell pointer in a circle by continually overwriting the command in cell B2 and looping.

a self-modifying macro. In the *a* macro, the code changes to reflect the change in the variable. The code in the macro named *g* stays static, though the cell the command addresses is always changing. Many self-modifying macros rely on string formulas, which can be unwieldy and confusing. You must carefully match quotation marks and ampersands to make sure that dynamic code is correctly sandwiched between text strings. Leave out one quotation mark and you can't enter the formula. *1-2-3* Releases 2.2 and higher let you use an @function as a command argument to create macros that are much easier to understand.

Not all self-modifying macros include string formulas. Figure 3 shows an example of a macro that rewrites itself as it loops.

The macro moves the cell pointer around in a circle by continually overwriting the label in *crazy* (cell B2) with the commands {DOWN}, {LEFT}, {UP}, and {RIGHT}, then looping control back to *crazy*.

SIGN IN, PLEASE

Macro programmers sometimes use self-modifying macros inappropriately. Such code should be used sparingly because it can be hard to read and to debug.

You can add information to the macros in figures 4 and 5 as they run. They work in *1-2-3* Releases 2.01 and higher. Both prompt you for your name and then use the @PROPER function to enter a formatted version of your name in the cell named *target*. For example, if you enter *cindy* at the prompt, the macros display *Cindy* in *target*.

But the self-modifying macro shown in figure 4 is more complicated than necessary. To try it, enter the labels as shown. Begin the entries in cells A9, B11, and B13 with an apostrophe. Use the Range Name Labels Right command to assign the labels in range A9..A15 as range names for the adjacent cells in column B. Then press MACRO-G to run the macro.

```
\g      {GETLABEL "Enter your name: ",name}
        {GOTO}target~
        @PROPER("
name
        "){CALC}~

target
```

Figure 4. In custom applications, users must often fill in part of the macro code. Here, the macro prompts you to enter your name and then enters the result of the formula @PROPER(*name*) in *target*.

Here's how it works:

{GETLABEL "Enter your name: ",name} prompts you to enter your name and stores your response as a label in the cell named *name*.

{GOTO}target~ moves the cell pointer to the cell named *target*.

@PROPER(" starts entering an @PROPER formula in the current cell. The macro then adds the label stored in *name* to the formula.

"){CALC}~ finishes the @PROPER formula, calculates the result with the {CALC} command, and enters the resulting string in the current cell.

The macro in figure 5, which incorporates the @PROPER formula in the {LET} command, accomplishes the same task in a much more direct fashion, without modifying itself. To try it, enter the labels as shown. Begin the label in cell A17 with an apostrophe. Assign the range name and run the macro by pressing MACRO-N.

Again, the macro prompts you for your name. Then {LET target,@PROPER(name)}~ enters the result of @PROPER(name) in *target*.

DYNAMIC LOOKUPS

A common type of self-modifying macro routine uses a string formula to look up an item in a table. The *g* macro in figure 6, for example, retrieves a name from a table by calling the *getname* routine. *Getname* looks up the name associated with the number you enter in the cell named *item* (cell B6). This number is passed to the routine by the argument *item*. The macro enters that name in the current cell, *target*.

To create the macro in figure 6, enter labels as shown, omitting the text printed in cell B9. Use the Range Name Labels Right command to assign the labels in column A as range names for the adjacent cells in column B. Use the Range Name Create command to assign the name *table* to range A1..B4. Then enter this formula in cell B9:

@VLOOKUP(item,table,1)

Enter one of the numbers from *table* in *item* (cell B6). Then run the macro by pressing MACRO-G. The macro

```
\n      {GETLABEL "Enter your name: ",name}
        {LET target,@PROPER(name)}~
```

Figure 5. The first technique that comes to mind isn't always the best. This macro performs the same task as the macro in figure 4, but it's easier to understand.

```
      A        B        C
1        108 Ann
2        123 Nick
3        221 George
4       1000 Marilyn
5
6  item          1000
7  getname   {DEFINE item:value}
8            {RECALC name}
9  name      Marilyn
10           ~
11
12 \g        {GOTO}target~
13           {getname item}
14
15 target    Marilyn
```

Figure 6. Here, the *getname* routine uses a string formula to look up a name in a table, then enters that name in the current cell.

```
      A        B        C        D        E        F        G        H
19 item          1000
20
21 \f        {GOTO}target~
22           {LET @CELLPOINTER("address"),@VLOOKUP(item,table,1)}~
```

Figure 7. This simple macro accomplishes the same task as the macro in figure 6 but without the string formula.

enters the name associated with that number in the cell named *target*.

Here's how it works:

{GOTO}target~ moves the cell pointer to *target*.

{getname item} calls the *getname* routine and captures the number from the table you entered in *item*. The *getname* routine works as follows:

{DEFINE item:value} takes the argument from the *getname* call and stores it as a value.

{RECALC name} recalculates the string formula in *name*. That formula returns the name in *table* that matches the number passed to the *name* routine. The macro enters that name in the current cell, *target*, using the @VLOOKUP formula, and ends with the tilde (~) in cell B10.

The macro in figure 7 is simpler. It accomplishes the same task without the string formula.

Self-modifying macros tend to run slightly faster than macros that use @functions as arguments. That speed edge can be important for macros that must process a great number of commands containing variable information. Despite the added confusion they can cause, self-modifying macros are essential when you work with older versions of *1-2-3*.

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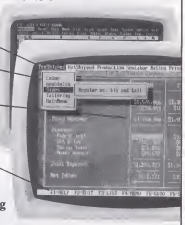

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Reach New Heights With Macros

BY LARRY ROSHFELD

The following 14 important macro commands boost the power and utility of your worksheets. They can help you access DOS, manage data-entry tasks, control screen display, and even write a macro that makes its own decisions.

As you re-create the macros shown on the following pages, remember to enter the macro code as labels by preceding each slash or backslash with an apostrophe. To name the macros and their accompanying subroutines, use the Range Name Labels Right command. Several of the macros involve named ranges. To name a range, use the Range Name Create command.

To invoke a macro after you have named it, hold down the MACRO key (Alt on most computers) and press the single-letter macro name.

LOTUS: The model described in this article is available on disk. See page 1 for details.

PHOTOGRAPHY BY SETH RESNICK

Get to DOS

Anyone who has used the System command in *1-2-3* knows how handy it is. You can temporarily exit the spreadsheet, perform a task or two within the operating system, and then just enter *exit* to resume work in *1-2-3*. The {SYSTEM} command, available in *1-2-3* Releases 2.2 and higher, does the same thing from within a macro.

The {SYSTEM} macro command, if used within a larger macro as {SYSTEM ""}, temporarily exits to an operating system prompt. The subdirectory that is current at the prompt is the subdirectory you were in when you entered the command that started *1-2-3*. Now you're free to perform tasks within the operating system. When you're through, enter *exit* to return to *1-2-3*.

You can also use the {SYSTEM} macro command with a parameter to automatically execute a specific command at the operating system prompt, such as the DOS commands DEL, DIR, FORMAT, or CHKDSK. Once the command is completed, you return to *1-2-3*, and the macro resumes control. Consider the following macro:

```
     A        B        C        D
1    \a       {SYSTEM "dir ¦ more"}
```

This macro automatically displays an operating system prompt and executes the DOS DIRECTORY command, which instructs DOS to list the files in the current directory and pause after each screenful so that you can view the list. When you're ready to see the next screenful, press Return. After displaying the entire directory listing, the macro returns you to *1-2-3*.

Another option is to use the name of a batch file as the parameter in the {SYSTEM} command. You can create the following batch file named TEST.BAT and save it in the subdirectory that you are in when you start *1-2-3*. To create this batch file, enter the following at the DOS prompt:

```
copy con:test.bat
dir a:¦more
pause
exit
^z
```

To create the ^z, press the F6 key and then press Return. This batch file lists all the files on drive A, pauses so that you can view each screenful, and then returns to *1-2-3* when you're through. Now suppose you have the following macro in your worksheet:

```
     A        B        C        D
3    \b       {SYSTEM "test"}
```

This macro exits to DOS, runs the file TEST.BAT, and returns you to *1-2-3*.

Create a Slide Show

If you create a worksheet that contains a large number of graphs, you may want to put together an automated presentation to display the graphs sequentially on the screen. When used in conjunction with the {WAIT} command, the {GRAPHON} and {GRAPHOFF} commands, available in *1-2-3* Releases 2.2 and higher, let you do just that. The following figure shows a typical slide-show macro. Note that the macro assumes that you have already created and named two graphs: BUDGET and SALES.

```
     A        B        C        D
5    \c       {GRAPHON budget}
6             {WAIT @NOW+@TIME(0,0,5)}
7             {GRAPHON sales}
8             {WAIT @NOW+@TIME(0,0,5)}
9             {GRAPHOFF}
```

Use the {GRAPHON} command to display a graph or to make a graph's settings current. When you use the name of a named graph as an argument, as in {GRAPHON budget} in the macro shown above, the command displays the named graph while the macro continues to run. When you do not include an argument, the {GRAPHON} command displays a full-screen view of the current graph while the macro continues to run. Finally, you can use the {GRAPHON} command to make a graph's settings current but not display the graph. To do so, you use two arguments: the name of the named graph and the word *nodisplay*, as in {GRAPHON budget,nodisplay}.

The command {WAIT @NOW+@TIME (0,0,5)} instructs the macro to wait five seconds before processing the next line of the macro. The {WAIT} command takes one argument, *time_number*, where *time_number* is a number, a formula that returns a number, or a reference to a cell that contains either a number or a formula that returns a number.

In this case, the *time_number* argument is the formula @NOW+@TIME (0,0,5), which determines when five seconds have passed. The @NOW function, which takes no argument, returns the value that corresponds to the current date and time on the computer's clock. The @TIME function takes three arguments: *hour*, *minutes*, and *seconds*, where *hour* is any integer from 0 to 23, and *minutes* and *seconds* are any integers from 0 to 59. The formula used as the *time_number* argument in the {WAIT} command adds five seconds to the current time. In so doing, it stops macro processing so that the graph named BUDGET is displayed for five seconds.

After waiting five seconds, the macro processes the next command, which uses the {GRAPHON} command to display the named graph SALES. The fourth line of the macro is identical to its second line. It pauses macro processing to display the graph for five seconds. Finally, the {GRAPHOFF} command in the last line of the macro clears the currently displayed graph.

Facilitate Data Entry

Within a macro, you can use the {GETLABEL} and {GETNUMBER} commands to prompt the user to enter a label

or value. Once the user presses Return, the macro enters the information in a location specified within the macro command. These commands are useful when your model requires information to be entered in specific cells.

The following segment of a larger employee-salary macro uses the {GETLABEL} and {GETNUMBER} commands to prompt the user to enter an employee's last name and to enter an annual percentage increase.

```
\d        {GETLABEL "Please enter last name: ",name}
          {GETNUMBER "Please enter percent increase: ",increase}
          {CALC}

name
increase
```

The {GETLABEL} and {GETNUMBER} macro commands require two arguments: *prompt* and *location*. *Prompt* is the message displayed in the control panel that tells the user what to enter. The prompt can be a string, which you enter within quotation marks, or the range name or address of a cell that contains a string, or a formula that evaluates to a string. *Location* can be a cell or range address. This specifies where to store the data the user enters in response to the prompt.

Whether you enter a label or a value in a {GETLABEL} command, the data is stored as a left-aligned label. In a {GETNUMBER} command, you must enter a value or a formula that returns a value, or the address of a cell that contains either a value or a formula that returns a value. If you mistakenly enter a label, the macro returns ERR in the current cell.

In the macro shown above, the {GETLABEL} command prompts you to enter a last name, which the macro stores in the range named *name* (cell B15). Next, the {GETNUMBER} command prompts you to enter a percentage increase, which the macro stores in the range named *increase* (cell B16).

The third line of the macro contains the {CALC} command, which tells *1-2-3* to recalculate the worksheet. When you use the {GETNUMBER} command in a macro, the CALC indicator appears, indicating that you need to recalculate the worksheet. This occurs even if the worksheet is set to Automatic recalculation. Consequently, by including a {CALC} command at the end of a macro that uses the {GETNUMBER} command, you ensure that the formulas return up-to-date results. That would be important, for example, if the number you enter for an employee's annual increase is used in formulas elsewhere in the model, to calculate annual salary, benefits, and so on.

Put It Here

The {GETLABEL} and {GETNUMBER} commands are useful when you want the macro to prompt you for data and then enter it into particular cells. Sometimes, however, you want the data entered into the current cell, not into a predetermined cell. That calls for the /XL and /XN commands.

The following macro automates the entry of a series of item names and catalog numbers:

```
\e        {GOTO}table~
loop      /XLPlease enter the product name:~~
          {RIGHT}
          /XNPlease enter the catalog number:~~
          {DOWN}{LEFT}
          {BRANCH loop}

Name      Number
```

The first line in the macro moves the cell pointer to the cell named *table* (cell A27). The /XL command in the second line prompts you to enter a product name, which the macro enters as a label in the current cell (cell A27). The next line of the macro moves the cell pointer one cell to the right (cell B27). The next line prompts you to enter a catalog number. If you try to enter a label, *1-2-3* beeps and displays an error message. To clear the error, press the Escape key and enter a number.

Next, the macro moves the cell pointer one cell down and one cell to the left, positioning it in cell A28. Finally, the {BRANCH} command transfers macro control to the range named *loop*, cell B20. This results in an endless data-entry loop. Because the loop is endless, you can enter an entire series of product names and catalog numbers. When you're through, stop the infinite-loop macro by holding down the Control key and pressing the Break key. If you use *1-2-3* Release 3.*x*, press the Escape key after you press Control-Break.

A La Mode

Sometimes you may want to control the screen display during a macro. For example, if a macro causes a worksheet to recalculate and recalculation takes 15 minutes, you might want to notify the user of the long delay. Use the

```
\f        {FRAMEOFF}
          {PANELOFF clear}
          {INDICATE "Recalculation Takes 15 Minutes"}
          {END}{HOME}{PGDN}
          {?}~
          {INDICATE}
```

{FRAMEOFF}, {PANELOFF}, and {INDICATE} macro commands to clear the entire screen, and display a one-line message.

In the first line of the macro above, the {FRAMEOFF} command suppresses display of the worksheet frame—the column letters and row numbers. The frame won't reappear until the macro ends or encounters a {FRAMEON} command. {FRAMEOFF} has no effect when WYSIWYG is loaded.

The {PANELOFF} command freezes the control panel and the status line and prevents the annoying flickering that occurs during macro processing. The argument *clear* erases the control panel and status line before freezing them. The control panel and status line remain frozen until the macro ends or until it encounters a {PANELON} command. {FRAMEOFF} and {FRAMEON} are available only in *1-2-3* Releases 2.2 and higher.

The {INDICATE} command replaces the mode indicator in the upper-right corner of the screen with a label that you specify. The command takes one argument, a string. In this case, the string is *Recalculation Takes 15 Minutes*. In addition to simply entering the string in the {INDICATE} command, you can enter either a reference to a cell that contains a string or a formula that evaluates to a string. If you use {INDICATE} with an empty string, as in {INDICATE ""}, the mode indicator completely vanishes from the display. If you use {INDICATE} with no argument, the mode indicator resumes standard operation—that is, it displays LABEL, VALUE, EDIT, WAIT, READY, and so forth.

The line {END}{HOME}{PGDN} moves the cell pointer to the bottommost active cell in the worksheet and then down one additional screen. This ensures that only the custom mode indicator is displayed. Finally, the command {?}~ pauses macro processing until you press Return. Once you do so, the {INDICATE} command returns the mode indicator to standard operation.

Intelligent Macros

Macros typically are used to automate repetitive tasks. However, there are times when you may want to let a macro make a decision. That calls for the {IF} command.

For example, suppose your worksheet contains a column of part numbers, shown below in range A39..A44. When you created the list, some part numbers were unavailable, so you entered a zero in their place. Now you want to replace the zeros with the label *Not Yet Available*. You need a macro that determines whether a cell contains a value and whether that value is equal to zero. If both conditions are true, the macro enters the label *Not Yet Available* in the cell. To keep the macro from continuing beyond the last entry in the column, tell it to stop processing when it reaches a blank cell. The macro named \g, shown below, can handle the chore.

The {GOTO} command in the first line of the macro moves the cell pointer to the cell named *list*, which is the first cell in the list of part numbers (cell A39). The {IF} command in the second line is similar to the @IF function. It takes one argument, a condition. If the condition is true, the macro processes the instruction immediately following the {IF} command in the same cell. If the condition is false, the macro immediately processes the command in the next cell down in the column.

The condition in an {IF} command is a logical formula or a reference to a cell that contains a logical formula. A logical formula evaluates to zero when the condition is false and to anything other than zero when the condition is true. In this example, the formula @CELLPOINTER("type")="b" is the logical formula. The @CELLPOINTER function returns the attribute of a cell. Here the formula determines whether the cell "type" is "b," or blank. If the cell is blank, the macro has reached the end of the list. It then processes the {QUIT} command and stops.

If the cell is not blank, the macro processes the next line of macro code in

```
Part Number
     105
       0
     115
       0
     175
       0

\g        {GOTO}list~
loop2     {IF @CELLPOINTER("type")="b"}{QUIT}
          {IF @CELLPOINTER("type")="v"#AND#@CELLPOINTER("contents")=0}Not Yet Available~
          {DOWN}
          {BRANCH loop2}
```

the column (cell B48). This {IF} command is similar to the previous one. It uses an @CELLPOINTER formula as the condition. In this case, the formula determines whether the current cell contains a value that is equal to zero. If it does, the macro enters *Not Yet Available* in the cell and then processes the {DOWN} command in the next line of code. The {DOWN} command moves the cell pointer down one cell to the next item in the list. If @CELLPOINTER determines that the current cell doesn't contain a value equal to zero, the macro processes the {DOWN} command. After processing the {DOWN} command, the macro processes the {BRANCH} command, which transfers macro control to the subroutine named *loop2*. The entire process repeats until every entry in the list has been evaluated.

Stop Screen Flicker

The techniques used in the macro named *g* (shown on the previous page) are very useful. But using that macro to process a long list of entries results in constant cursor movement and replacement of values, which causes the screen to flicker annoyingly. To stop the screen from flickering, use the {WINDOWSOFF} and {PANELOFF} commands, as shown in the following macro.

	A	B	C	D
52	\h	{WINDOWSOFF}{PANELOFF}		
53		{BRANCH \g}		
54				

The {WINDOWSOFF} command freezes the worksheet area while a macro runs. The worksheet area remains frozen until the macro encounters a {WINDOWSON} command or until the macro ends. The {PANELOFF} command, discussed earlier, freezes the control panel and the status line.

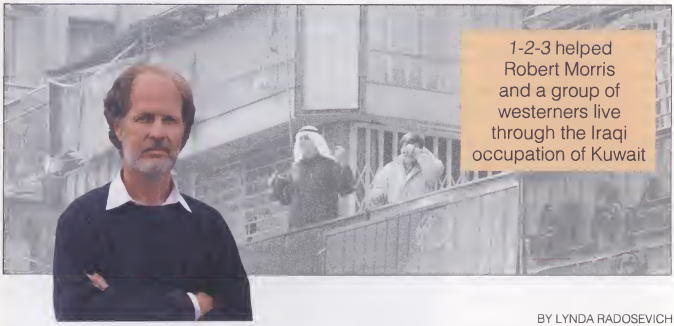
Used together, the {WINDOWSOFF} and {PANELOFF} commands speed up macro processing, because *1-2-3* no longer redraws the worksheet contents and the control panel during each loop. After the macro processes the {WINDOWSOFF} and {PANELOFF} commands, the {BRANCH} command passes control to the macro named *g*, which executes faster. The only indication that the macro is actually running is the display of the CMD indicator on the bottom of the screen. When the macro is finished executing, *1-2-3* redraws the display, and all of the changes appear simultaneously.

The macros presented here provide a brief glimpse of the power of these 14 commands. Look for ways to apply them as you write new macros and enhance existing ones. You will be rewarded with better, faster, and harder-working macros.

Larry Roshfeld, a frequent contributor to *LOTUS*, is a product-marketing manager for Lotus Development Corp.'s *1-2-3 for DOS*.

14 COMMANDS TO SOUP UP YOUR MACROS

{BRANCH}	Transfers macro control from the current column of macro instructions to another location for further macro instructions
{FRAMEOFF}	Suppresses display of the worksheet frame
{FRAMEON}	Redisplays the worksheet frame
{GETLABEL}	Prompts the user to enter a label and stores the label in a predetermined location
{GETNUMBER}	Prompts the user to enter a number and stores the number in a predetermined location
{GRAPHOFF}	Clears the currently displayed graph
{GRAPHON}	Displays a graph or makes a graph's settings current
{IF}	Evaluates a condition as true or false
{INDICATE}	Replaces the mode indicator with a user-specified label
{PANELOFF}	Freezes display of the control panel and the status line
{SYSTEM}	Temporarily exits *1-2-3* to go to an operating system prompt
{WAIT}	Pauses macro processing for a specified period of time
{WINDOWSOFF}	Freezes activity in the worksheet area while a macro runs
/XL	Prompts the user to enter a label and stores the label in the current cell
/XN	Prompts the user to enter a number and stores the number in the current cell



1-2-3 helped Robert Morris and a group of westerners live through the Iraqi occupation of Kuwait

BY LYNDA RADOSEVICH

A Template for Survival

Hidden in Kuwait City's al-Muthana apartment complex while the Iraqi army terrorized the country, a small band of westerners trusted a *1-2-3* Release 3 template to inventory their supplies and ration their food. For four months, the group "used high technology to survive," says Dr. Robert Morris, who built the template. In addition to keeping them fed, Morris's simple worksheet gave the fugitives a sense of power over their fate.

Morris, a quiet, reserved dental health consultant from Boston, first learned *1-2-3* while earning his master's degree in health policy and management at the Harvard School of Public Health. "I used it to do statistics," he says, "repetitive stuff."

In the spring of 1987, Morris accepted an invitation to help upgrade Kuwait's oral health-care system. Once in the country, he honed his *1-2-3* skills by handling his personal finances and running statistical analyses for a paper he was writing on the risk of AIDS to dental workers.

Morris had been in Kuwait for three and a half years when Saddam Hussein's tanks swept into the country on August 4, 1990. "Many people thought it would be over in a day or two," Morris reports. "They made up T-shirts that read 'Iraq 1, Kuwait 0.' But I was pretty worried."

Several unsuccessful attempts to leave the country during the next three weeks convinced Morris that he "had to disappear." Baghdad ordered American, British, Japanese, French, and German nationals to surrender and announced that Kuwaitis who failed to turn in westerners would suffer ignominious and public death. "We thought we'd either be turned in by our Kuwaiti neighbors or get them killed," recalls Morris. He returned to the mostly abandoned al-Muthana in downtown Kuwait City, joining an amorphous group of 20 Europeans, Australians, and Filipinos who had stayed in the apartment building or filtered back after failed escape attempts.

Existing Undercover

Leaving the building became increasingly dangerous. Iraqi secret police swarmed through the adjoining Plaza Hotel, and army troops took over the glass-covered mall connecting the al-Muthana with the hotel and a shopping center. In the first week, the men and women of the al-Muthana group snuck into abandoned apartments to gather supplies. They quickly discovered that most had already been ransacked by Iraqi soldiers and civilians.

The proximity of the soldiers scared the group into adopting security measures. They wore quieter, soft-soled shoes and used secret knocks and telephone codes. They also agreed to pool food. "As the noose got tighter and tighter," Morris says, "we made our rules tighter."

Down to two days' worth of food and afraid to step out the door, the group decided that securing a long-term supply of provisions was their top priority. By early September, with the help of the Kuwaiti resistance and those foreigners not targeted by the Iraqis, Morris and several other men hiding in the building had established a food-smuggling ring. Late at night, a Syrian friend delivered food and other essentials through the al-Muthana's underground garage.

The group soon began receiving bulk items from Kuwaiti restaurants whose owners were happy to unload provisions before the Iraqis confiscated them. As inventories mounted—50 kilos of beans, 40 kilos of frozen potatoes—tracking the items became too cumbersome for pencil and paper. "It was impossible," says Morris. "We had no clue how much food we had or how long it would last."

Fortunately, the electricity was still on, and Morris had an ALR PC and a borrowed copy of *1-2-3* Release 3. He knew

PHOTOS: THE BETTMANN ARCHIVE (BACKGROUND), STEVE LISS (INSET)

the spreadsheet was the perfect tool to track their goods. Morris fired up his PC and went to work.

Fighting Back with 1-2-3

First the group inventoried their supplies. Morris spent three days building a worksheet that tracked the amount of food they received, their average daily consumption, and how long they could live without more supplies. Once the spreadsheet was completed, Morris spent about five minutes a day updating it, usually at about 2 A.M., after the midnight delivery had been distributed. He worked by the glow of the monitor, shielded by carefully taped windows. Of all the people hiding from the Iraqis, claims Morris, "no group was more high-tech in obtaining and tracking food."

The worksheet tracked 151 items. It listed the types of containers the food was in, the code names of the apartments where the food was stored, how much was in each apartment, and how much was available overall.

Using Adelle Davis's book *Let's Eat Right to Keep Fit* as a guide, Morris broke down each type of food into servings per kilo, and the worksheet then calculated the total servings available. Armed with this detailed information, the group began to divide deliveries and distribute supplies according to need. By considering the day the group completed its inventory of supplies as day 1 and figuring on nine servings per person per day, or about 1,800 calories, Morris determined how many days' worth of supplies they had accumulated.

The worksheet was flexible enough to handle the comings and goings of individuals. A macabre demonstration of the template's flexibility occurred on October 10, when a British couple who violated the group's security rules daily by walking their dog finally got caught and did not return. While the rest of the group hid from the Iraqi security police who temporarily occupied the couple's apartment, Morris deleted their names from the worksheet. *1-2-3* automatically recalculated how long the rest of the group could live on the remaining food.

The computer became a focal point. "Every day people came by to look at the spreadsheet," Morris remembers. "They made comments and suggested improvements in the formulas." The program made those hiding out feel useful and in control. Doing the calculations "made people feel better," Morris asserts.

AL-MUTHANA SURVIVAL GROUP
TOTAL FOOD AND DAYS AVAILABILITY

Row	FOOD ITEM	TYPE	UNITS	R	J	K	C+M	K+M	CL	D+B	TOTAL KGS	SERV/ KG	TOTAL SERV
7	MEATS AND FISH												
9	Corned Beef	CANNED	KG	5	5	5	10	10	5	10	50	8.5	425
10	Tuna	"	"	10	10	10	20	20	10	20	100	8.5	850
11	Sardines	"	"	3	3	3	6	6	3	6	30	8.5	255
13–14	FRUITS/ VEGETABLES												
16	Green Peas	CANNED	KG	10	10	10	20	20	10	20	100	8.5	850
17	Corn, Kernels	"	"	5	5	5	10	10	5	10	50	8.5	425
18	Corn, Cream	"	"	5	5	5	10	10	5	10	50	8.5	425
154–155	DRIED BEANS/ PASTA/FLOUR												
157	Black Eyed Bean	PKG	KG	15	15	15	30	30	15	30	150	10	1500
158	Split Peas	"	"	10	10	10	20	20	10	20	100	10	1000
159	Lentils	"	"	5	5	5	10	10	5	10	50	10	500
161	Grand Total >>												10225
162–164	Total days of food available at 9 servings per day (Z161/9 servings per day)/10 people) >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>												113.6

Survival Model. This abridged version of the worksheet Dr. Morris created shows how the group hiding in the al-Muthana apartment complex kept track of its food supply. Using every other column for grid lines, Morris entered descriptions of more than 150 items in column B and their container types in column D. The codes for each apartment and the quantity of each item stored there are listed in columns H through T. The formula @SUM(H9..T9) in column V totals the weight of each item in all apartments. Servings per kilo, determined outside the spreadsheet, went into column X. The formula +V9*X9 in column Z multiplies the total kilos from column V by the servings per kilo from column X. The formula @SUM(Z9..Z160) in cell Z161 calculates the grand total of the servings. The formula (Z161/9)/10 in cell Z164 divides the total in cell Z161 by nine servings per day, then divides this quotient by the number of people—there were 10 in the group at this point—to get the number of days of food the group had accumulated. It was difficult to measure actual consumption, so the worksheet simply estimated the total days' food supply from the date of original inventory.

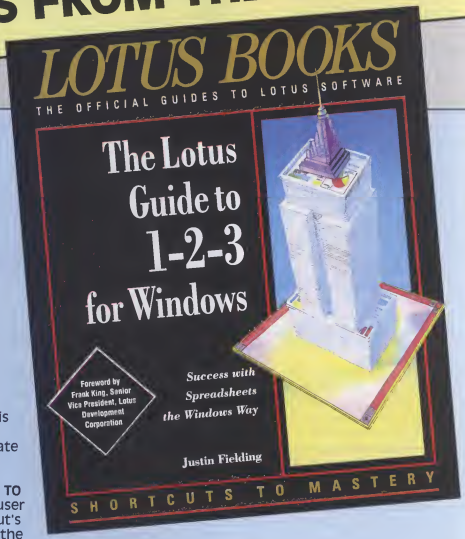
"We were on a roller coaster for months," says Morris. "In the beginning we'd believe anything. We'd get so excited and then nothing would happen. *1-2-3* gave us psychological relief and it gave us–it gave me–something to do." The group didn't know when their ordeal was going to end, but at least they knew how long they could hold out. In mid-November the worksheet indicated that they had accumulated enough supplies to last until the next June.

A Way Out

Eventually, news came that the Iraqis were releasing some of the foreigners trapped in Baghdad. On December 2, after four months in hiding, Morris used false documents–obtained from the embassy of a neutral European country–to leave Kuwait for Baghdad. After eight days of detention in Baghdad's al-Rashid Hotel, Morris, still under an assumed identity, was allowed to leave when Iraq released its hostages. The remaining people at the al-Muthana were also allowed out of Kuwait City.

"I think we did the right thing by hiding out," says Morris. "You never know what would have happened. Some hostages were abused. Some were hidden in chemical plants. There was no way of predicting the future." And there was no way of predicting that *1-2-3* would play such a vital role in helping a group of fugitives endure enormous physical and psychological hardships.

LOTUS BOOKS
SOLUTIONS FROM THE SOURCE



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Justin Fielding

Foreword by Frank King, Senior Vice President, Lotus Development Corporation

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CIRCLE 111 ON READER SERVICE CARD

In Pursuit of the Perfect Portfolio

STEVEN GREENBERG

1-2-3 and solver technology can help balance investments for the ideal combination of risk and return.

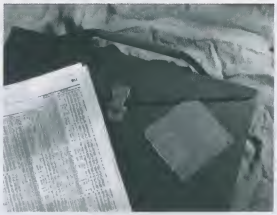
BY DANIEL H. FYLSTRA

Minimum risk. Maximum return. These two conflicting objectives define the perfect investment portfolio. Since the time of the Medicis, investors have tried to squeeze that extra bit of performance from their portfolios while holding risk to a minimum.

In the 1950s, economist Harry Markowitz developed a mathematical method for doing just that. Markowitz's model was hailed in academia, but unfortunately its computations were too expensive for practical use on the computers of the day.

LOTUS The model described in this article is available on disk. See page 1 for details.

Over the past 15 years, however, portfolio optimization has moved from ivory-tower theory to common practice on Wall Street and around the world. Investment-banking powerhouse Salomon Brothers, for example, uses optimization techniques to help institutional clients efficiently allocate their enormous global assets. "An optimizer allows you to go after the highest possible rate of return, based on a specific level of risk," says Joseph Mezrich, a Salomon vice president in equity portfolio analysis. "It's a way to articulate your investment strategy."



Spreadsheet optimizers such as the Solver utility in *1-2-3/G*, *1-2-3 for Windows*, and *1-2-3* Release 3.1+ can help anyone determine the resource allocation with the best risk/return tradeoff. (If you're not using one of these releases, you can use an add-in or stand-alone optimizer.) The technique works equally well for corporate- or personal-investment portfolios.

This article explains Markowitz's asset-allocation theory in a series of steps that culminates in a model tailored for use with a spreadsheet optimizer. To build the models that illustrate each of these steps, refer to the setup box.

Why Optimize?

Spreading investment dollars across several different stocks, or across different types of securities, such as stocks, bonds, and CDs, can reduce exposure to a downturn in the value of any single security. With such diversification, risk and return depend on the performance of the entire portfolio rather than on any single investment.

The first step in building a diversified portfolio is to choose which stocks, bonds, or other securities to buy. The next step is to decide what portion of your funds should be invested in each one.

Unfortunately, optimization doesn't offer much help in picking low-risk, high-performance securities. The worldwide competition among sophisticated investors creates a relatively efficient market, in which security prices reflect the latest available information. So investments that earn above-average returns generally carry above-average risk.

But for a given portfolio of securities, optimization can ensure an efficient allocation of funds, yielding a higher return than an inefficient allocation for the same risk. Conversely, an efficient portfolio lets you achieve the same return as an inefficient one, but with lower risk.

A Simple Example

The example in figure 1 shows the dramatic difference in risk between two different allocations of investment dollars among the same three stocks. The three hypothetical stocks in this portfolio—Average Airlines, Fred's Fertilizer, and Slick Oil Co.–are all sensitive to changes in the price of oil. Average Airlines and Fred's Fertilizer are heavily dependent on petrochemical products. Therefore, they do well when the price of oil is low but poorly when the price is high. Slick Oil, on the other hand, benefits from high oil prices.

Range C4..E4 of figure 1 contains estimates of how oil will perform over the next year. These estimates are pretty conservative: There's a 25% chance that the price of oil will rise substantially, a 25% chance that it will fall substantially, and a 50% chance that it won't change much. Range C8..E10 shows estimates of the returns expected from the three stocks, given each of these scenarios.

Now consider two portfolios, A and B. The funds in portfolio A are evenly divided between Average Airlines and Fred's Fertilizer, with nothing invested in Slick Oil. The funds in portfolio B are evenly divided between Average Airlines and Slick Oil, with nothing allocated to Fred's Fertilizer.

Range A14..F15 shows the estimated return from each portfolio given each oil-price scenario, plus a weighted average of the three scenarios. The expected returns from both portfolios are the same (8.63%), but portfolio A's returns range from 3.5% to 14% while portfolio B's returns range from 7.5% to 10%. In statistical terms, portfolio B's variance (a measure of volatility or risk) is less than portfolio A's. Investors seeking to control risk would generally prefer portfolio B.

Portfolio B is less risky because Average Airlines and Slick Oil vary in opposite directions and their risks tend to offset each other. In statistical terms, the returns of Average Airlines and Slick Oil are negatively correlated (or have negative covariance), while the returns of

	A	B	C	D	E	F
1	Portfolio Diversification: A Simple Example					
2	----------					
3	Oil price		Higher	Same	Lower	
4	Chance of occurring		25%	50%	25%	
5						
6						Expected
7	Forecasted returns					Return
8	Average Airlines		3%	9%	16%	9.25%
9	Fred's Fertilizer		4%	8%	12%	8.00%
10	Slick Oil		12%	8%	4%	8.00%
11						
12						
13	Portfolio returns:					
14	A (Airline & Fertilizer)		3.50%	8.50%	14.00%	8.63%
15	B (Airline & Oil)		7.50%	8.50%	10.00%	8.63%

Figure 1. In this simple example, the expected returns for portfolios A and B are equal (range F14..F15). However, the range of possible returns for portfolio A is larger than that for portfolio B because the airline and fertilizer stocks have positive covariance, while the airline and oil stocks have negative covariance.

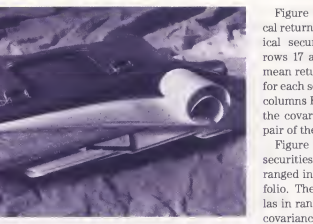
Average Airlines and Fred's Fertilizer are positively correlated. Although portfolio B is better, notice that *both* portfolios are less risky than the stocks themselves. This is the effect of diversification.

Variance and Covariance

How do you compute variance and covariance? Markowitz was able to use the tools of statistics by assuming that returns from securities (and portfolios of securities) follow a normal distribution. The peak of the bell-shaped curve is the mean (or expected) rate of return. The variance (or the standard deviation, which is the square root of the variance) measures the spread of the distribution. About two-thirds of the curve falls within one standard deviation of the mean, and about 95% falls within two standard deviations.

For example, if the mean return from a portfolio is 5% and the variance is 0.0064, the standard deviation is 0.08, or 8%. The security's return should fall between –3% and 13% (5% – 8%, and 5% + 8%) two-thirds of the time, and between –11% and 21% (5% – 16%, and 5% + 16%) 95% of the time. These sample ranges may seem risky, but they are typical of long-term corporate bonds. Common stocks have standard deviations closer to 20%.

You can use historical data to compute



the variance of a single security. The greater the variance in the price of a security, the riskier the security. The @VAR formulas in row 19 of figure 2 calculate the variance of the historical data points from their mean.

To measure the effect that you saw between Average Airlines and Slick Oil in the example above, you can compute the covariance between these (or any pair of) securities. The following formula computes the covariance of two stocks, where x and y are spreadsheet ranges that contain rates of return for the stocks, and xy is a range that contains the product of corresponding elements of x and y:

$$@\mathrm{AVG}(xy) - @\mathrm{AVG}(x) \times @\mathrm{AVG}(y)$$

Figure 2 shows the historical returns for three hypothetical securities. Formulas in rows 17 and 19 compute the mean return and the variance for each security. Formulas in columns E, F, and G compute the covariance between each pair of the three.

Figure 3 shows the three securities from figure 2 arranged in a more formal portfolio. The file-linking formulas in range B8..D10 show the covariance between each pair of securities. To optimize the portfolio, you must figure out what percentage of the total investment funds you should allocate to each security (range B3..D3).

The expected return from your portfolio (cell H20) is simply the average of the expected returns from the individual securities, weighted by the percentages assigned in range B3..D3. The portfolio variance in cell H18 is a function of the weight of each security, the variance of each security, and the covariance between each pair of securities. By changing the percentages in range B3..D3, you can find the expected return and the variance, or riskiness, of your portfolio for any combination of the three securities. That's helpful, but choosing the optimal portfolio by juggling the values in range B3..D3 would require a good deal of trial and error. That's where the Solver comes in.

	A	B	C	D	E	F	G
1	Computing Expected Return, Variance, and Covariance						
2							
3							
4	Period	Inv1	Inv2	Inv3	Inv1*Inv2	Inv1*Inv3	Inv2*Inv3
5							
6	1	10%	25%	21%	2.50%	2.10%	5.25%
7	2	8%	21%	46%	1.68%	3.68%	9.66%
8	3	9%	18%	-15%	1.62%	-1.35%	-2.70%
9	4	5%	8%	23%	0.40%	1.15%	1.84%
10	5	7%	20%	31%	1.40%	2.17%	6.20%
11	6	4%	15%	44%	0.60%	1.76%	6.60%
12	7	6%	-1%	15%	-0.06%	0.90%	-0.15%
13	8	8%	23%	25%	1.84%	2.00%	5.75%
14	9	10%	-4%	-15%	-0.40%	-1.50%	0.60%
15	10	8%	25%	50%	2.00%	4.00%	12.50%
16							
17	Return	7.50%	15.00%	22.50%			
18							
19	Variance	0.04%	1.00%	4.72%			
20							
21	Covariance (Inv1, Inv2)			0.03%			
22	Covariance (Inv1, Inv3)			-0.20%			
23	Covariance (Inv2, Inv3)			1.18%			

Figure 2. This worksheet uses historical data to calculate the mean return and variance for investments 1, 2, and 3. Formulas in range D21..D23 calculate the covariance between each pair of stocks.

Optimizing Risk and Return

Optimizers are designed to find values of variables that maximize or minimize the value of a target formula while satisfying certain constraints. In this problem, the variables are the percentages of funds allocated to the three securities. The optimal formula either minimizes risk or maximizes return. You can choose either of these objectives as your target.

There are also three constraints to this problem. First, you cannot allocate negative funds to any security. In other words, the model doesn't allow borrowing or short selling. Second, the sum of the weights must be 100% (or 1).

The third constraint addresses either risk or reward—whichever objective you didn't address in your optimal formula. If you choose to maximize return, you must

specify a certain level of risk as a constraint. If you choose to minimize risk, you must specify a certain level of return. For example, the constraint

```
portfolio variance <= 0.0144
```

tells the Solver to maximize return while holding portfolio variance at or below 1.44%. The formula

```
portfolio return >= 0.169
```

tells the Solver to minimize portfolio variance while keeping the portfolio return at or above 16.9%.

Setting Up the Problem

The constraints are expressed as logical formulas in range H2..H6 of the worksheet in figure 3. These are necessary if you're using the Solver utility in *1-2-3/G*, *1-2-3 for Windows*, or *1-2-3* Release 3.1+. They read:

Cell	*Formula*
H2	+B3>=0
H3	+C3>=0
H4	+D3>=0
H5	+F3=1
H6	+H18<=0.0144

The formulas in range H2..H4 tell the Solver that the values in cells B3, C3, and D3—the percentages of investment funds

HOW TO SET UP THE SECURITIES-OPTIMIZATION WORKSHEETS

MODEL 1 (from figure 1): Variance and Covariance

1. Releases

This model works in *1-2-3* Releases 2.*x* and 3.*x*, in *1-2-3/G*, and in *Symphony* Release 2.*x*

2. Column widths

Column	*Width*
A	18
C	10
D	10
E	10
F	12

For example, to set the width of column A, place the cell pointer in column A, select /Worksheet Column Set-Width, and enter *18*.

3. Cell formats

Format	*Range*
Percent 0 (*Symph*: %0)	C4..E10
Percent 2 (*Symph*: %2)	F8..F10, C14..F15

For example, to assign the Percent 0 (*Symph*: %0) format to range C4..E10, select /Range Format Percent (*Symph*: MENU Format %), enter *0*, and indicate range C4..E10.

4. Labels

Enter all labels in figure 1. Begin the labels in ranges A8..A10 and A14..A15 with two spaces. To create the dashed line, enter \– in cell A2 and copy it to range B2..D2.

Right-align the labels in ranges C3..E3 and F6..F7. For example, to right-align the labels in range C3..E3, select /Range Label Right (*Symph*: MENU Range Label-Alignment Right) and indicate range C3..E3.

5. Values

Enter the values in range C4..E10 of figure 1.

6. Formulas

Cell	*Formula*
C14	+C$8*0.5+C9*0.5

Copy cell C14 to range C14..E15.

F8	+$C$4*C8+$D$4*D8+$E$4*E8

Copy cell F8 to ranges F9..F10 and F14..F15.

MODEL 2 (from figure 2): Calculating Expected Return, Variance, and Covariance

1. Releases

This model works in *1-2-3* Releases 2.*x* and 3.*x*, in *1-2-3/G*, and in *Symphony* Release 2.*x*.

2. Column widths

Column	*Width*
B	10
C	10
D	10
E	11
F	11
G	11

3. Cell formats

Format	*Range*
Percent 0 (*Symph*: %0)	B6..D15
Percent 2 (*Symph*: %2)	E6..G15, B17..D19, D21..D23

4. Labels

Enter all labels in figure 2. To create the dashed lines, enter \– in cell A2 and copy it to ranges B2..E2 and A5..G5.

Right-align the labels in range B4..G4. Select /Range Label Right (*Symph*: MENU Range Label-Alignment Right) and indicate range B4..G4.

5. Values

Enter the values in range B6..D15 of figure 2.

6. Formulas

Cell	*Formula*
E6	+B6+C6
F6	+B6+D6
G6	+C6+D6

Copy range E6..G6 to range E7..E15.

B17	@AVG(B6..B16)
B19	@VAR(B6..B16)

Copy range B17..B19 to range C17..D17.

D21	@AVG(E6..E16)–@AVG(B6..B16) *@AVG(C6..C16)
D22	@AVG(F6..F16)–@AVG(B6..B16) *@AVG(D6..D16)
D23	@AVG(G6..G16)–@AVG(C6..C16) *@AVG(D6..D16)

7. Range names

Name	*Range*
return1	B17
return2	C17
return3	D17
var1	B19
var2	C19
var3	D19
covar1_2	D21
covar1_3	D22
covar2_3	D23

For example, to create the range name *return1*, select /Range Name Create (*Symph*: MENU Range Name Create), enter *return1*, indicate cell B17, and press Return.

allocated to the three securities–must each be greater than or equal to Ø. The formula in cell H5 tells the Solver that the sum of those percentages must equal 100%, or 1. Finally, the formula in cell H6 tells the Solver that portfolio variance must not exceed 1.44%.

The formula in cell H6 sets a limit on risk, so the goal in this portfolio is to get the highest possible return given that level of risk. The Solver will accomplish this by adjusting the values in cells B3, C3, and D3 until it finds the combination that maximizes return (cell H20). At the same time, this combination must satisfy the constraints in range H2..H6.

Activate the Solver. The Solver dialog box appears in the worksheet. (In figure 3, we used the mouse to drag the Solver dialog box to the right side of the screen.) Fill in the dialog box as shown in figure 3. To specify the adjustable-cell range, type *B3..D3*, or indicate this range with the mouse. Move the cursor to the constraint-cells box by clicking the mouse or pressing the Tab key, then indicate range H2..H6. Use the same procedure to indicate the optimal cell (cell H20). Since you're maximizing portfolio return, select Max if it is not already selected.

Select Solve to find the optimal allocation of funds. The efficient portfolio in this case allocates Ø% of your investment

8. Save the file

Select /File Save (*Symph*: SERVICES File Save) and enter the file name *histdata*.

The portfolio models that follow contain formulas that are linked to the information in this file. Each time you update information in this file, save it so that the linked formulas will be updated automatically. (File linking is available only in *1-2-3* Release 2.2 and higher and in *Symphony* Release 2.2.)

9. Modifying the worksheet

To add data, place the cell pointer in row 16, select /Worksheet Insert Row (*Symph*: MENU Insert Rows), and indicate the number of rows needed.

To add securities, place the cell pointer in row E, select /Worksheet Insert Column (*Symph*: MENU Insert Columns), and indicate the number of columns needed. Then add formulas for the multiplication columns and covariance necessary for the extra securities.

WARNING: Too many extra columns will create a great deal of work. For example, if you add a fourth security to this example, you will have to create four additional multiplication columns and four additional covariance formulas.

MODEL 3 (from figure 3): Optimizing the Portfolio with the 1-2-3 Solver Utility

1. Releases

This model works in *1-2-3/G*, *1-2-3 for Windows*, and *1-2-3* Release 3.1+.

2. Column widths

Column	*Width*
A	16
B,C,D	7
G	4

3. Cell formats

Format	*Range*
Percent 1 (*Symph*: %1)	B3..F4
Percent 2 (*Symph*: %2)	BB..D10, A13..H21

4. Labels

Enter all labels in figure 3, including the word *to* in cell G21. Begin the label in cell B21 with an apostrophe.

Use the Range Label Right (*Symph*: MENU Range Label-Alignment Right) command to right-align the labels in ranges B2..F2, B7..D7, and A8..A10, and in cells A13 and G21.

5. Values

Enter the values in range B3..D3 of figure 3.

6. Formulas

NOTE: The file-linking formulas specified below assume that the file named HISTDATA.WK1 is in the current directory. If it is not, you must include the full path name to file HISTDATA in these formulas. If you are working in *1-2-3* Release 3, either save HISTDATA as a WK3 file or add the .WK3 extension to the file references in the formulas.

If you are using *1-2-3* Release 2.01 or *Symphony* Release 2, use the File Combine command to get this data from file HISTDATA, or enter it manually.

Cell	*Formula*
F3	@SUM(B3..E3)
B4	+<<histdata>>return1
C4	+<<histdata>>return2
D4	+<<histdata>>return3
B8	+<<histdata>>var1
C8	+<<histdata>>covar1_2
D8	+<<histdata>>covar1_3
B9	+<<histdata>>covar1_2
C9	+<<histdata>>var2
D9	+<<histdata>>covar2_3
B10	+<<histdata>>covar1_3
C10	+<<histdata>>covar2_3
D10	+<<histdata>>var3
B13	+B3
C13	+C3
D13	+D3
A14	+B13
A15	+C13
A16	+D13
B14	+B$13*$A14*B8

Copy cell B14 to range B14..D16.

B18	@SUM(B14..B17)
B20	+B3*B4

Copy range B18..B20 to range C18..D18

F21	+H20–(2*H19)
H2	+B3>=Ø
H3	+C3>=Ø
H4	+D3>=Ø
H5	+F3=1
H6	+H18<=0.0144
H18	@SUM(B18..E18)
H19	@SQRT(H18)
H20	@SUM(B20..E20)
H21	+H20+(2*H19)

You must insert one column and two rows for each security you add to this model. Place the cell pointer in cell E11, then use the Worksheet Insert Row and Worksheet Insert Column (*Symph*: MENU Insert Rows and MENU Insert Columns) commands to create additional rows and columns for the variance/covariance matrix. Then place the cell pointer in row 18 (formerly row 17) and insert a row for each additional investment in the *Working calculations* section.

Add the additional file-linking formulas to your expanded variance/covariance matrix, following the pattern in this model. Add constraints below cell I7.

funds to investment 1, 68.8% to investment 2, and 31.2% to investment 3 (figure 4). The pre-Solver values were 30%, 30%, and 40%.

This portfolio meets the required variance of 0.0144. The most efficient allocation of funds at that level of variance increases the expected return to 17.34%.

To translate portfolio variance into a meaningful number, recall the earlier discussion of the normal distribution, variance, and standard deviation. Standard deviation is the square root of variance. With enough historical observations, you can be 95% certain that the return on your portfolio will not fall more than two standard deviations from the expected return.

The formulas in cells F21 and H21 use the standard deviation in cell H19 to calculate this range. In the optimal portfolio shown in figure 4, there's a 95% chance that the portfolio's return will fall somewhere between −6.66% and 41.34%. To get a narrower range, you would have to set a lower variance constraint and re-optimize the portfolio.

The Efficient Frontier

Of course, different investors are willing to tolerate different levels of risk. The appropriate portfolio variance for a 35-year-old executive, for example, would be higher than that for a 65-year-old widow. Optimization techniques allow you to find a portfolio that maximizes return for any given level of risk.

If you plot the risk and return of efficient portfolios, you obtain a curve called the efficient frontier. According to portfolio theory, an investor should never choose any portfolio (or mix of securities) below this frontier, since there is a portfolio with lower risk and the same return, or one with higher return and the same risk, on the frontier.

Harry Markowitz, William Sharpe, and Merton Miller shared the 1990 Nobel Prize in economics for their development of the mathematical methods that allow us to establish this efficient frontier. (Sharpe extended Markowitz's work by developing models that can more easily accommodate large numbers of securities.) With the power of today's solver technology, you can use these methods at your desktop to make more rational investment decisions for yourself or your company.

Daniel H. Fylstra is president of Frontline Systems and is a leading authority on spreadsheet-optimization techniques.

SOLVING WITHOUT THE SOLVER: TWO ALTERNATIVES

If you don't work with *1-2-3/G*, *1-2-3 for Windows*, or *1-2-3* Release 3.1+, all is not lost. A popular add-in program, *What-If Solver* (from Frontline Systems of Palo Alto, Calif.), can handle the nonlinear constraints required for portfolio analysis. This add-in works in *1-2-3* Releases 2.*x* and 3.*x* and in *Symphony* Release 2.*x*. Another product that can optimize a portfolio using the Markowitz method is *Gino* (from Lindo Systems of Chicago), a stand-alone package that does not work with *1-2-3*.

What-If Solver allows you to use the same portfolio-optimization model as in *1-2-3*'s Solver utility. The only difference is in the way you express the problem's constraints. (You also lose the Solver dialog box that comes with *1-2-3/G* and *1-2-3 for Windows*.) In *Gino*, you set up the same variables and formulas in the program's nonspreadsheet format.

Figure 4 shows the same portfolio-optimization problem modeled in *What-If Solver*. (The figure shows the portfolio after it has been optimized.) In *What-If Solver*, constraints are not modeled as equations. Instead, you use the add-in menu to set constraints, identify adjustable and optimal cells, and run the optimization.

In *Gino*, there are no menus. You enter all information pertaining to variables, constraints, and the optimization target directly into the program's command-line interface and solve the problem by typing *go* at the colon prompt.

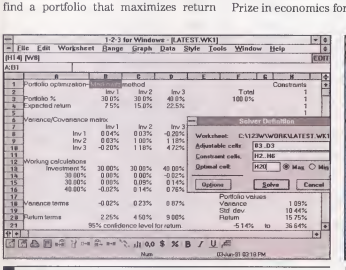


Figure 3. The optimization matrix (ranges B8..D10 and B14..D16) uses the mean return, variance, and covariance figures calculated by the worksheet in figure 2. In *1-2-3/G* and *1-2-3 for Windows*, you use the Solver dialog box shown on the right side of the screen to specify adjustable cells, constraint cells, and the optimal cell. Selecting the Solve option from the dialog box will optimize this portfolio.

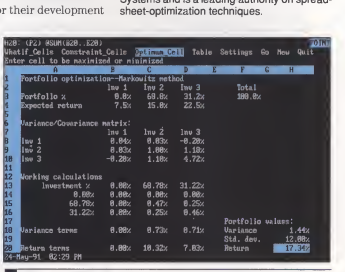


Figure 4. If you're using a release of *1-2-3* that doesn't come with the Solver, you can use a solver add-in or a stand-alone program to optimize nonlinear problems. Here, the *What-If Solver* add-in has optimized the portfolio shown in figure 3. With the *What-If Solver*, you identify constraints by using custom menus rather than worksheet formulas.

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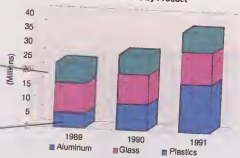
The Materials Research Group Recommendation:

FOCUS Aluminum

This study conducted by the Materials Research Group provides the basis for our recent recommendation that WeCycle continue to expand its aluminum recycling capacity by another 70% over the next 6 years. The graph to the right shows the increasing proportion of our business provided by the aluminum division during the past three years, now approximately half of all revenues. It is our opinion that, at this rate of growth, aluminum recycling will continue to offer our company its greatest opportunity for expansion over the next decade, and certainly into the 21st century.

Gross Revenues by Product



WECYCLE PRODUCT	1989	1990	1991
Aluminum			
East	2,323,426	4,019,527	7,315,539
Central	1,372,347	2,374,160	4,320,972
West	1,726,492	2,986,631	5,436,033
Total	5,422,265	9,380,518	17,072,544
Glass			
East	2,496,721	2,567,821	2,798,925
Central	3,598,757	3,217,693	3,507,285
West	4,217,635	4,471,294	4,873,710
Total	10,313,113	10,256,808	11,179,920
Plastics			
East	2,897,493	3,171,243	3,234,688
Central	1,873,938	1,823,897	1,860,171
West	2,378,942	1,967,421	2,006,769
Total	7,150,373	8,962,361	7,101,608

Glass and Plastics

As can be inferred from the graph to the left, glass and plastics recycling has been holding steady throughout this same period, and has consequently become a smaller proportion of our overall sources of revenue.

Although this group would strongly recommend that WeCycle Waste Corporation do all that is necessary to increase its activities in these areas, our studies have shown that aluminum will become increasingly the material of choice in the shipping, heavy manufacturing and container industries.

Aluminum

It is our opinion that sources of aluminum products will be pressed close to their limits over the next decade.

Therefore, we propose that WeCycle Waste Corporation invest in more aluminum capacity during the next five years in order to take the best advantage of this increasing market demand.

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ng your hardware.

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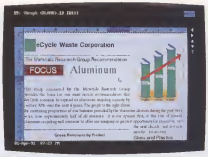

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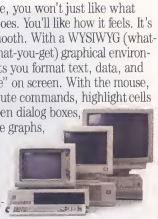

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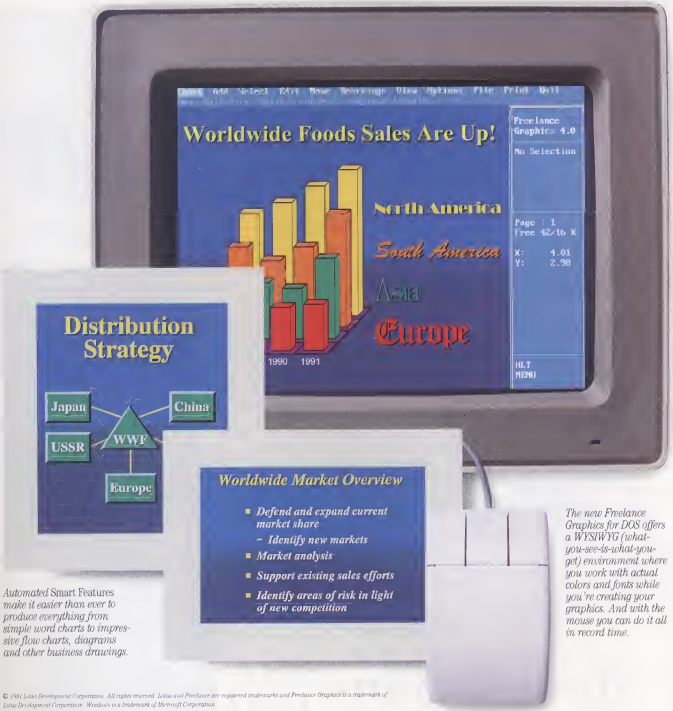

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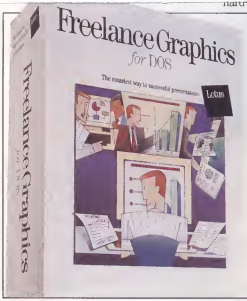

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Freelance Graphics for DOS

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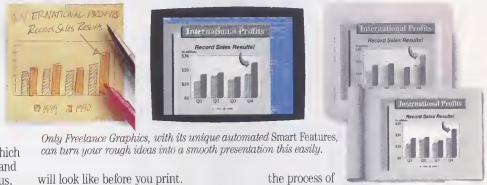

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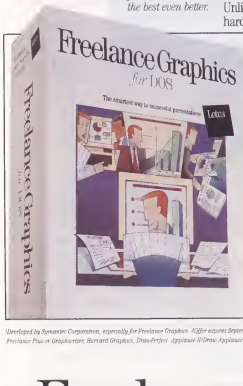

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Ami Pro for Windows

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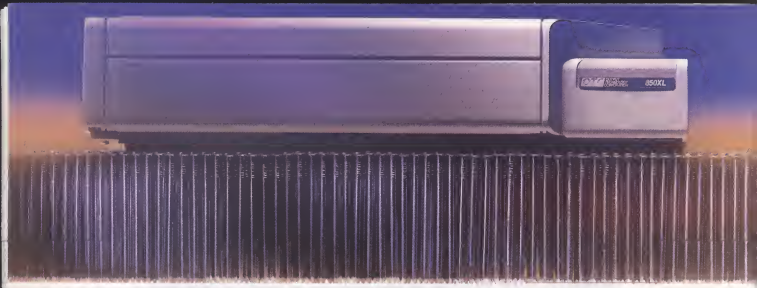

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Playing the DISCOUNTS

This CD and T-bill analyzer helps you know when to hold 'em and when to fold 'em.

BY JACK McGRATH

SLAVE CAPOLLA

Companies that deal with large amounts of cash typically put that money to work without sacrificing liquidity by investing in short-term securities, such as certificates of deposit and treasury bills. Often, these securities are handled as zero-coupon instruments, which means they're purchased at an amount lower than face value and redeemed at face value on the maturity date.

Investors don't necessarily buy and redeem such instruments from the financial institution that issues them. They may deal instead with brokers who trade the paper at a discount, which is a function of the instrument's time to maturity and the prevailing market rates. A company won't go broke holding its CDs and T-bills until they mature, but it's sometimes smarter to roll the funds in one instrument over to another with a different discount and maturity.

To evaluate such a move, you can use

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The model described in this article is available on disk. See page 1 for details.

	A	B	C
1	SECURITY-ROLLOVER TIMING ANALYZER		
2			
3	Today's date		07/08/91
4			
5	Currently held instrument		
6	Maturity date	7/20/91	
7	Today's discount yield		8.65%
8			
9	New instrument		
10	Maturity date	8/15/91	
11	Today's discount yield		9.00%
12	Est discount yield on 7/20/91		9.10%
13			
14			
15	Days to maturity, 1st instrument		12
16	Days to maturity, 2nd instrument		38
17	Difference in maturity dates		26

Figure 1. The input section lets you enter the maturity dates and current discounts of two CDs or two treasury bills plus a prediction of the second instrument's future discount.

the simple model presented here, for current DOS versions of *1-2-3* and *Symphony* (see the setup box for relevant releases). Then the only hard part is second-guessing the securities market.

Here's an example: Today is July 8 and your company holds a CD that matures in 12 days, on July 20. This CD has a discount today of 0.265%, or 26.5 basis points (hundredths of a percent). That is, you can sell it for 0.265% less than its face value. The effective annual yield, given a 360-day year, is 8.65%. Another CD, which matures in 38 days, on August 15, has a discount today of 0.872% (87.2 basis points), for an effective annual yield of 9.00%.

That initially seems like a better place to invest your money, unless you expect discounts to rise in the near future. If discounts on CDs go up between the 8th and the 20th and you hold the current CD until it matures on the 20th, you'll be able to buy the second CD at a discount that produces a higher yield than a CD bought today. But you'd pass up the higher yield on the second CD in the 12 days between the 8th and the 20th.

The question is, What would the second CD have to yield for the 26 days between July 20 and August 15 to make up for the revenue you miss by staying with the first CD for 12 days?

For this discussion, we express the required change in a security's effective yield as a change in its *discount yield*, or effective annual yield. If you determine that the required discount yield is, say, 9.155%, your decision is easy. If you predict that on July 20 the discount yield for the second CD will be greater than 9.155%, hold the first instrument and buy the new one on the 20th. Otherwise, sell the first instrument and buy the new one now.

Some experts prefer to use different terms. They try to predict the increase in an instrument's discount yield between today and a future date, not the actual discount on that date. The increase is expressed in basis points. It's really a matter of semantics. To say that the second CD's discount yield moves from 9.00% to 9.155% is to say that its discount yield increases by 15.5 basis points.

The model presented here provides an easy way to determine the *indifference point*: the future discount yield for the second instrument, where the return is the same whether you hold the first instrument or roll it over. If you think the second instrument's discount yield will be higher than the indifference point by the first instrument's maturity date, wait until that date to make the switch. If you think the discount yield will be substantially lower than the indifference point, make the switch now.

Figure 1 shows the model's input section. This area also contains formulas that compute the current date, the number of days between the current date and maturity dates of the instruments, and the difference between the maturity dates.

To use the model, enter the maturity date as a label in cell C6 and enter the current discount yield of your CD or treasury bill in cell C7. (See "About Entering Dates.") In cells C10 and C11, enter the maturity date and current discount yield of a second instrument. The second instrument must be of the same type as the first. For example, if you now hold a CD, the instrument you're evaluating must also be a CD.

In cell C12, enter your estimate of the second instrument's yield as of the first instrument's maturity date. Cell B12 has a string-returning formula that concatenates the label in cell C6 with the phrase *Est discount yield on*. Using this formula instead of a label makes it easy to remember what date to use for your estimate. You'll see later how to modify the worksheet so that you can enter estimates of basis-point increases in cell C12.

Figure 2 shows the model's results section. Although there are two sets of formulas, one for CDs and one for treasury bills, you'll use only one at a time.

ABOUT ENTERING DATES

This model accepts maturity dates for the two instruments as labels to make it easier to enter the dates and to allow the formula in cell B12 to add the first instrument's maturity date to a message. Although *1-2-3* Releases 3 and 3.1 can accept a date in *mm/dd/yy* format and automatically convert the entry to a date value, you must still enter the dates in cells C6 and C10 as labels. The setup box advises you to assign the label format to those cells so that you won't have to remember to enter the apostrophe. If you enter *7/20/91*, the entry will automatically become '*7/20/91*.

If you use *Symphony* or an earlier release of *1-2-3*, entering a date in *mm/dd/yy* format without the apostrophe gives you the result of two division operations (for example, the entry *7/20/91* becomes a formula that returns 0.003846153). You might want to add the following macro to your worksheet in case you forget to begin a date with an apostrophe:

	G	H	I
1	\d	{EDIT}{HOME}'~	

Assign the name *\d* to cell H1. To invoke the macro, hold down the MACRO key (Alt on most computers) and press D. The macro adds an apostrophe to the beginning of the entry in the current cell.

	A	B	C
21	RESULTS SECTION		
22			
23			
24	FOR CERTIFICATES OF DEPOSIT		
25		Relative yield	100.66%
26		Requires discount yield of	9.155%
27		...or basis-point increase of	15.5
28		Action	Hold
29			
30	FOR TREASURY BILLS		
31		Relative yield	100.67%
32		Requires discount yield of	9.249%
33		...or basis-point increase of	24.9
34		Action	Hold

Figure 2. Based on your estimate of future discount rates, the results section of the model tells you whether you should hold on to your CD or treasury bill or roll it over.

Cells C25 and C31 compute the yield of the second instrument relative to the first. For example, cell C25 indicates that if the instruments are CDs, the second CD's yield between now and its maturity date will be 100.66% of the hypothetical yield of the first CD between now and the same date. These results are only intermediate values for other formulas.

Cells C26 and C32 compute the required discount yields for the second instrument. Given the values entered in figure 1, it makes sense to hold the CD you've got if you think the July 20 discount yield for the new CD will beat 9.155%. It makes sense to hold a T-bill if you predict that the July 20 discount yield for the new paper will beat 9.249%. Cells C27 and C33 convert the required discount yields to basis-point increases. Finally, the string-returning formulas in cells C28 and C34 compare the required CD and T-bill discount yields to the prediction you enter in cell C12. For example, if the result in cell C26 is greater than the value in cell C12, cell C28 returns *Hold*. Otherwise, the formula returns *Sell*.

Build the model using the instructions in the setup box. Note that the formula given for cell C3 is @DATE(91,7,8). That formula, along with the labels and values in range C6..C12, lets you check your work by comparing your results with the ones in the figures. After you've set up the worksheet, change the formula in cell C3 to @NOW.

If you'd prefer to enter predictions of basis-point changes in cell C12, change the formula in cell B12 to read:

+"Est basis-pt incr by "&C6

Change the formula in cell C28 to read:

@IF(C$12>C27," Hold"," Sell").

(There are seven spaces before *Hold* and *Sell*.) Then copy cell C28 to cell C34.

To put the model to work, enter your own data in range C6..C12, press the PageDown key, and check the results in the appropriate section. Remember, the advice given by the string-returning formulas is only as good as the prediction you enter in cell C12. ■

Jack McGrath is the editor of the newsletter *Jack McGrath's @MAX* and the author of the Lotus Book *1-2-3 at Work* (Brady Books, 1990), from which this article is adapted.

HOW TO SET UP THE SECURITY-ROLLOVER WORKSHEET

1. Releases
This model works in *1-2-3* Releases 2.01, 2.2, 2.3, 3, and 3.1 and in *Symphony* Releases 2.0 and 2.2.

2. Column widths

Column	*Width*
A	3
B	30
C	12

For example, to set the width of column A, place the cell pointer in column A, select /Worksheet Column Set-Width (*Symph:* MENU Width Set), and enter *3*.

3. Cell formats

Format	*Range*
Date 4	C3
Label (*1-2-3* Releases 3 and 3.1 only)	C6, C10
Percent 2 (*Symph:* % 2)	C7, C11..C12, C25, C31
Percent 3 (*Symph:* % 3)	C26, C32
Fixed 1	C27, C33

For example, to assign the Date 4 format to cell C3, select /Range Format Date 4 (*Symph:* MENU Format Date 4) and specify cell C3. To assign the Label format to cell C6, select /Range Format Other Label and specify cell C6.

4. Labels
Enter all labels in figure 1, including the labels in cells C6 and C10. Begin each label with an apostrophe. Do not enter a label in cell B12. Enter the labels in rows 21 through 30 of figure 2. Begin the label in cell B27 with an apostrophe. Do not enter a label in cell C28. Copy range B25..B28 to cell B31.

5. Values
Enter the values shown in cells C7, C11, and C12. End each of these entries with a percent sign.

6. Cell formulas

Cell	*Formula*
C3	@DATE(91,7,8)
B12	+"Est discount yield on "&C6
C15	@MAX(@DATEVALUE(C6)–C3,0)
C16	@MAX(@DATEVALUE(C10)–C3,0)
C17	+C16–C15
C25	(1–C7/360•C15)•(1+C11/360)^C16
C26	(C25^(1/C17)–1)•360
C27	(C26–C$11)•10000
C28	@IF(C$12>C26, " Hold"," Sell")

HINT: There are seven spaces before *Hold* and *Sell*. Copy range C27..C28 to cell C33. The formulas in range C33..C34 initially give meaningless results.

C31	(1–C7/360•C15)/(1–((C16/360)•C11))
C32	(C31–1)•360/C17

7. Saving the file
To save the template with its formulas intact, select /File Save (*Symph:* SERVICES File Save) and enter a file name that isn't listed in the default directory.

dFacts Are In.

DATABASE COMPARISON TABLE	dBASE IV version 1.1	Paradox version 3.5	FoxPro version 1.02
EASE OF USE			
Control Center organizes data, queries, forms, reports, labels, applications on one screen	Yes	No	No
Create applications *without programming*	Yes	Yes	No
Modern pulldown menus for all Design Tools	Yes	No	Limited
Query by Example (QBE) for easy access to information	Yes	Yes	No
Context specific help by menu item	Yes	No	No
PRODUCTIVITY			
Quick Layout for automatic forms, reports and labels	Yes	No	Yes
Application Generator for quick application development	Yes	Yes	No
Automatic code generation for all Design Tools	Yes	No	No
Automatic maintenance of multiple indexes for ordering data	Yes	No	No
Memo fields for notes, letters, descriptions	Yes	No	Yes
POWER & FLEXIBILITY			
Bold, underline, italic, subscript, superscript text for high impact reports and labels	Yes	No	No
User Defined Functions for extending programming language	Yes	No	Yes
Data input validity checking in forms	Yes	Yes	Yes
Multi-user transaction processing ensures data integrity	Yes	No	No
Number of file formats imported/exported	7	6	3
INDUSTRY STANDARDS			
#1 Selling, #1 Rated multiuser database; over 3 million users (1)(2)	Yes	No	No
Compatible with dBASE III PLUS data and applications	Yes	No	Yes
Compatible versions for DOS, VAX VMS, Macintosh, SunOS and other UNIX platforms (3)	Yes	No	Limited
Structured Query Language (SQL) integrated with programming language	Yes	No	No

(1) dBASE III PLUS and dBASE IV comprise approximately 35% of PC database systems sold (3 times nearest competitor) according to the most recent report by the market research firm Audits & Surveys (Oct. 1990) (2) Software Digest rated dBASE IV #1 among multiuser databases, October 1990 (3) Versions of dBASE IV are shipping for DOS, VAX, and SunOS. Macintosh and other UNIX Platforms are announced

Based on what our customers tell us, we made a list of some of the most important features to look for in data management software.

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Of course we aren't the only ones who have come to this particular conclusion.

Software Digest rates dBASE IV version 1.1 the #1 Multiuser Database (Vol. 7, No. 13, Oct. '90).

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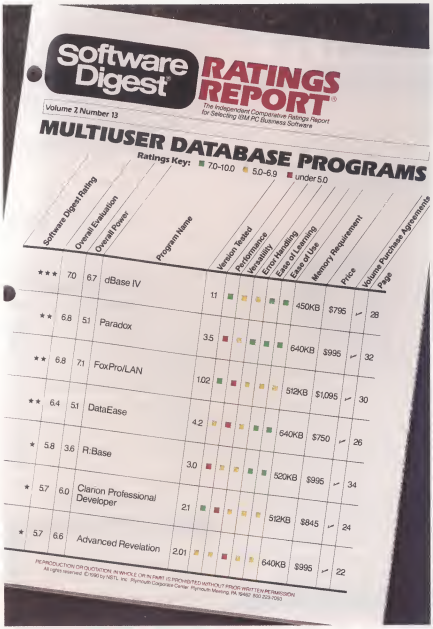

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CIRCLE 113 ON READER SERVICE CARD

Q&A ?????

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1-2-3 / Symphony

Delete rows

Q I use the *Symphony* macro shown below to erase all the zeros that appear in the current column:

```
\p  {IF @CELLPOINTER("contents")=0}{MENU}E~
    {DOWN}
    {IF @CELLPOINTER("type")<>"b"}{BRANCH \p}
    {BEEP}
```

I tried to modify the macro so that it would delete every row that has a zero in the current column. I substituted the commands DR for the command E at the end of the first macro command. When any two adjacent rows contain zeros, however, the modified macro fails to erase the second row.

Marty Richman
Toronto, Ontario

A If any cell in the current column contains a zero, the macro below deletes the row in which that cell is located.

Create the macro by entering labels as shown. If you use *1-2-3*, replace the entry in cell B2 with *'/WDR~*. Begin the entry in cell A1 with an apostrophe. Assign the label *\p* as the name for cell B1.

To run the macro, move the cell pointer to the first cell of the column you wish to clean up. Hold down the MACRO key (Alt on most computers) and press P.

Here's how the macro works:

{IF @CELLPOINTER("contents")<>0}{DOWN} moves the cell pointer down if the current cell doesn't contain a zero and then transfers macro control to cell B3.

{MENU}DR~ deletes the current row. It is executed only if the previous command found that the current cell contains a zero.

{IF @CELLPOINTER("type")<>"b"}{BRANCH \p} restarts the macro if the current cell contains an entry.

{BEEP} sounds a beep to alert you that the macro has reached a blank cell.

{QUIT} ends the macro.

1-2-3 / Symphony

Message mess

Q I've written a macro to guide users when correcting existing information or supplying new information in specific cells. The macro moves the cell pointer to the required cells, then displays a message that tells the user what to do. What gave me trouble was getting the macro to both display a message and accept input into the highlighted cell.

I first tried to use the expression {GETLABEL "message",@CELLPOINTER ("address")}. It doesn't work, but I don't know why. I finally decided to use the expression {GETLABEL "message", temp}'{temp}~ and a named cell to store the user's entry temporarily before inserting it in the current cell. This works, but there must be a better solution.

Dale L. Sorden
Milwaukee, Wis.

```
\p      {IF @CELLPOINTER("contents")<>0}{DOWN}
        {MENU}DR~
        {IF @CELLPOINTER("type")<>"b"}{BRANCH \p}
        {BEEP}{QUIT}
```

A The technique that you settled on is very sound. Another approach you might consider uses dynamic macro code.

Dynamic code usually consists of string formulas that resolve to macro commands. The results of the formulas can vary with changing conditions in the spreadsheet. For example, a dynamic macro statement might use the @CELLPOINTER function to include the address of the current cell within a macro {LET} or {GETLABEL} command.

You might use the following dynamic macro command:

```
+"{GETLABEL ""message"","&
  @CELLPOINTER("address")&"}~"
```

Be careful with dynamic code. This particular expression accepts input directly to the current cell. However, the expression is updated only when the worksheet is recalculated. If your macro moves the cell pointer and then processes this command, the entry may not end up in the desired cell. Guard against this possibility by including a {RECALC} command within the dynamic expression. The modified formula is as follows:

```
+"{RECALC here}{GETLABEL ""message"",
  "&@CELLPOINTER("address")&"}~"
```

The cell that contains this particular statement must be named *here*. If needed, assign a unique range name to each cell that contains a dynamic expression.

Symphony

Extract dates

Q I use *Symphony*'s Query Extract command to copy dates from a database. But when I use the formula @DATEVALUE("*day-month-year*") in the Criterion range, *Symphony* doesn't extract the appropriate records.

I originally entered the dates in a FORM window, and they all appear as serial numbers in the SHEET window. The documentation indicates that the @DATEVALUE function converts dates

from any of the display formats into the corresponding date serial numbers. However, *Symphony* extracts the correct records only when I use the Range Values command to convert the @DATEVALUE formula into a value. Am I doing something wrong?

Jennifer Stevens
Inco United States Inc.
New York, N.Y.

A You're leaving out an important step when you create your database-matching criterion. When you enter a value as a criterion, *Symphony* extracts records that exactly match that value. The rules are different when you enter a formula as a criterion.

A Criterion formula must refer to a cell in the first row of the database. *Symphony* extracts each record that, when plugged into the formula in place of the reference to the first record, returns an answer other than zero or ERR.

Suppose, for example, that you'd like to extract all records for January 4, 1991. The appropriate Criterion formula is +*date-field*=@DATEVALUE("4-JAN-91"), where *date-field* is the first record of the field that contains the dates you're trying to extract.

1-2-3 / Symphony

{GETLABEL} macro control

Q I'm trying to write a macro that uses the {GETLABEL} command. I want to enter a range name in response to the command. The macro should then move the cell pointer to that range and allow me to enter data.

John E. Anderson
Pittsburgh, Pa.

A A simple approach is to have the {GETLABEL} command store your entry in an isolated cell and then have the macro call that cell as a subroutine.

	A	B	C	D	E
1					
2		targ			
3					
4	\t	{GETLABEL "Enter target: ",targ}			
		{GOTO}{targ}~			

Enter the labels as shown and use the Range Name Labels Right command to assign the labels in range A1..A3 as range names for the adjacent cells in column B.

When you run the macro, the {GETLABEL} command prompts you to enter a target range. The macro stores your entry in the cell named *targ*.

The {GOTO} command in the second line of the macro presses the GOTO key and produces the prompt *Enter address to go to*. Then the command {targ} calls the cell named *targ* as a subroutine. This types your entry in response to the prompt. Finally, the tilde presses Return and sends the cell pointer to the top-left cell of the range whose name you entered.

Run the macro a few times to better understand how it works. You'll find that you can enter a cell address or range name in response to the macro's prompt.

1-2-3 / Symphony

How's that sum?

Q One of my employees entered the formula @SUM(A1..A5,1) in cell A7 of her worksheet to round the sum of entries in range A1..A5 to one decimal place. The following illustration is a

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CIRCLE 114 ON READER SERVICE CARD

simplification of her worksheet.

	A	B	C	D
1	10			
2	20			
3	10			
4	20			
5	10			
6	==========			
7	71			

The entries in range A1..A5 total 70, but the @SUM formula returns 71. I'm surprised that *1-2-3* even let her enter such an odd @SUM formula. What's going on?

Pat Spohn
ITT Lester Industries
Solon, Ohio

A The @SUM function totals the items in a list, which can include range references, cell references, range names, formulas, and values.

In the formula @SUM(A1..A5,1) the list items are range A1..A5 and the value 1. They add up to 71. You can sum several ranges in a single expression by including the ranges within the same @SUM function. For example, the expression @SUM(A1..A5,C1..C5) sums entries in ranges A1..A5 and C1..C5.

You can sum the results of several formulas by including the formulas in an @SUM function. The expression @SUM(A1^2,A2^2) squares the values in cells A1 and A2, then adds them together.

Use the @ROUND function along with the @SUM function to round the sum of a list of entries. For example, use the formula @ROUND(@SUM(A1..A5),1) to round the sum of range A1..A5 to one decimal place.

Allways

{WINDOWSOFF} broken?

Q I use macros to automate printing in *Allways*. I'd like to freeze the display, but the {WINDOWSOFF} command doesn't seem to work. The documentation says the screen control commands will work in *Allways* in Text mode. Is there some trick to it?

Sandra Hagglund
Manitoba Public Insurance Corp.
Winnipeg, Manitoba

A Advanced macro commands that control the screen, such as {PANELOFF}, {FRAMEOFF}, and {WINDOWSOFF}, don't work in *Allways* in Text mode. This is a documentation error.

1-2-3

References don't combine

Q I have two files that contain formulas with absolute references. I tried to combine ranges from both files into a single file, but I ran into some trouble. I used the File Combine Copy Named/Specified-Range command and the absolute references of the formulas in the incoming file, adjusted relative to their

APRIL CONTEST RESULTS

In the April issue, we asked readers to submit the best method for interweaving formulas and values or labels. We provided the following example:

	A	B	C	D
1	Label 1			
2		0		
3	Label 2			
4		0		
5	Label 3			
6		0		
7	Label 4			
8		0		

We entered the labels in column A and the formula @SUM(C2..E2) in cell B2. Then we copied the formula to cells B4, B6, and B8. We wanted to know how to move the labels from column A into column B quickly, without retyping them or disturbing the existing formulas.

Many readers submitted macros that did the job, but in this case a macro isn't the best solution. Readers who submitted winning entries came up with a simpler method that uses two of *1-2-3* or *Symphony*'s File commands. First they used the File Save command to save a copy of the file to disk. Then they used the File Combine Copy command to move the labels from column A to column B. The File Combine Copy command copies data from a file on disk into the current worksheet. Blank cells in the file on disk don't affect cell entries in the current worksheet.

To try this in *1-2-3*, follow the steps described to the left to create the model. Select /File Save and enter a file name that doesn't exist in the default directory. Then move the cell pointer to cell B1 and select /File Combine Copy Named/Specified-Range, enter *A1..A7*, and specify the name of the file you just saved. The labels in cells A1, A3, A5, and A7 come into the worksheet in cells B1, B3, B5, and B7. The formulas in cells B2, B4, B6, and B8 remain unchanged. Finally, erase the labels in column A.

If you use *Symphony*, create the model, assign a range name to range A1..A7, and save the file. Move the cell pointer to cell B1, select SERVICES File Combine Copy Named-Area, and enter the range name. Then select Ignore Formulas and specify the file name. Erase range A1..A7.

An alternate method that works in both *1-2-3* and *Symphony* is to use the File Xtract command to copy the data from range A1..A7 to a new file. Move the cell pointer to cell B1 and use the File Combine Copy Entire-File command. When you see the prompt for the name of the file to combine, specify the name of the new file. Erase the labels in column A.

The following readers submitted winning entries:

Peter Caplow, Minneapolis; Edmund M. Coleman Jr., Winston-Salem, N.C.; Lynn Crouse, Abilene, Kans.; Kevin M. Elliott, South Bend, Ind.; Diane Farmer, Oak Park, Ill.; Thomas F. X. Flynn, St. Petersburg, Fla.; L. A. Garnier, Cambridge, Mass., John Graham, Spring, Tex.; Michael Klock, Beverly Hills, Calif.; K. A. Lefko, Bethesda, Md.; Mark S. Marino, Mahwah, N.J.; Billie Jo McDaniel, Dallas; John Miranda, Lansdale, Pa.; Doug Oleinik and Ron Vissers, Milwaukee; Deborah Peele, Lenoir, N.C.; Wilton M. Rett, Peru, Ill.; David E. Ritter, Douglassville, Pa.; Deb Ross, Grand Rapids, Mich.; David Royce, St. Louis; Richard C. Russell, Cleveland; Sharon Skaryd, Saginaw, Mich.; Ira Spear, Tampa, Fla.; Mike Stone, Marshfield, Mo.; John Stropp, Rochester, Minn.; Jim Thomas, Pittsburgh.

positions in the target file. In other words, the formula +$A$1+2, which was located in cell A2 of the incoming file, became +$A$11+2 when combined into cell A12 of the target file.

Can I combine files without losing the absolute references?

J. N. Simmons
Bowater Inc.
Calhoun, Tenn.

A *1-2-3* automatically adjusts cell references in a combined formula, relative to their locations in the target worksheet. It doesn't matter if the references are absolute; there's no way to get around this functionality.

You could convert the formulas to labels before you combine them into the new file. To convert a formula into a label, place the cell pointer in the cell that contains the formula, press the EDIT key (F2 on most computers), and then press the Home key. Type an apostrophe and press Return.

After you convert the formulas to labels, save the worksheet under a new name to preserve the original file. Retrieve the target worksheet and issue the File Combine command. Specify the new file name as the file to combine. Then convert the labels back to formulas by moving the cell pointer to each one and pressing EDIT Home Delete Return. Those formulas will retain their original cell references.

The macros below will speed this task. To create the macros, enter labels as shown. Begin the entries in cells A1 and A3 with an apostrophe. Use the Range Name Labels Right command to assign the labels in range A1..A3 as names for the adjacent cells in column B. Use the macros to convert formulas to labels and labels back to formulas.

	A	B	C	D
1	\l	{EDIT}{HOME}'~		
2				
3	\f	{EDIT}{HOME}{DEL}~		

Move the cell pointer to a cell that contains a formula, hold down the MACRO key (Alt on most computers), and press L. To convert a label back to a formula, move the cell pointer to a cell that contains a label, and press MACRO-F.

This material was prepared by Daniel Gasteiger and the Technical Editors, with the help of the Lotus Customer Support staff.

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More Tips on Using Lotus Products

1-2-3 / Symphony

Shift vs. NumberLock

You can enter numeric data into a worksheet and move from cell to cell faster if you use the left Shift key with the keypad instead of the NumberLock key. The Shift key and the NumberLock key have the same effect, but the Shift key is faster. When you release the Shift key, you can use one of the Arrow keys to enter your data and move to the next cell.

Quintus S. Williams
CBS Records Inc.
Carrollton, Ga.

1-2-3 / Symphony

Retaining values in File Combine

To create a template from a worksheet, I use the File Combine Subtract Entire-File command to erase all the values from the worksheet but retain all the labels and formulas. Sometimes, however, I need to retain some of the values. I do this by making those values formulas and then using the File Combine command. For example, if cell A20 contains the value 3,000, I move the cell pointer to cell A20, press the EDIT key, and enter *+1–1* at the end of the value. *1-2-3* and *Symphony* then recognize cell A20 as a formula.

E.P. Neyland
Wilton, Conn.

To save a few keystrokes, enter *+0* at the end of each value you want to retain.

1-2-3

Reaching new heights

I use *1-2-3* Release 2.2 and *Allways* to print most of my reports. Since my Epson FX-850 printer can't print in Landscape mode, I assign small fonts to the data so that it will fit across a printed page. But this condenses the report, making it unattractive and difficult to read. I could space the rows by using the Worksheet Row Set–Height command, but I'd have to issue this command for every row in the report area.

My solution is to use *1-2-3* to insert a column to the left or right of the area to be printed and to use *Allways* to format that new column with a larger font. For example, if my report data is formatted for 10-point Times, I format the blank column for 14-point Times. The report prints in 10-point Times but the rows are tall enough to accommodate 14-point Times.

Whenever I specify the Print range in *Allways*, I do not include the extra column.

Jean Lynd
Swansea, Ill.

1-2-3 / Symphony

Viewing subdirectory names

I don't want to view all the file names in the root directory of my hard disk to retrieve a file that I know is stored in one of my subdirectories. To avoid viewing all these file names, I select /File Retrieve, press the Escape key once, press the Spacebar once, type a period and an asterisk, and then press Return. *1-2-3* Release 2.*x* lists all my subdirectories.

Marcus A. Anderson, CPA
City of Scottsdale
Scottsdale, Ariz.

Your method assumes that your current directory is the root directory (C:\). If the current directory is a subdirectory, select /File Directory and enter c:\ to get to the root directory.

You can also get a listing of all the subdirectories on your hard disk in DOS by entering *dir ** at the DOS prompt in the root directory. This command will also list files that don't have an extension.

1-2-3 / Symphony

Determine column or row number

I discovered that I can use the @HLOOKUP function to return the column number of a particular field in a database.

The syntax of this function is @HLOOKUP(*x,range,offset_number*). It compares *x* to each cell in the top row of *range*. When it finds an exact match, it moves down that column the number of rows specified by *offset_number* and returns the contents of that cell. Row and column numbering begin with 0.

If you want the column number of a particular field, *offset_number* must be 0, and the top row of *range* must contain labels. For example, enter the labels shown in the figure below:

	A	B	C
1	Name	Dept.	Phone
2	Tom	Research	x999
3	Dick	Sales	x543
4	Harry	Production	x754

Enter the following formula in cell D1:

@HLOOKUP("Dept.",A1..C4,0)

The documentation states that the @HLOOKUP function returns the contents of a cell, but in this case it returns *1*, which is the column number of the *Dept.* field.

To find the row number of a particular record, use the @VLOOKUP function. Enter the following formula into cell D2:

@VLOOKUP("Harry",A1..C4,0)

The formula returns *3*, which is the row number of the record that contains *Harry* in the *Name* field.

Nitin Apte
Columbus, Ohio

The *x* argument can be the address of a cell that contains a label. For example, enter

Dept. in cell E1 and change the formula to @HLOOKUP(E1,A1..C3,0).

1-2-3 / Symphony

File Combine error checking

I use a simple technique to determine whether the proper cells have coincided in a File Combine Add or File Combine Subtract operation. First, I make sure that all cells in the current file are protected. (In *1-2-3* select /Range Protect; in *Symphony* select MENU Range Protect Prevent-Changes.) All the ranges in a new worksheet are protected by default. Next, I unprotect all the cells in the incoming worksheet range. (In *1-2-3* select /Range Unprotect; in *Symphony* select MENU Range Protect Allow-Changes.)

In this protection scheme, any cells in the current file whose contents change as a result of a File Combine Add or a File Combine Subtract command are also unprotected. Cells whose contents don't change (formula cells, blank cells, and value cells that don't get added to or subtracted from) remain protected. On a color monitor, unprotected cells and protected cells appear in different colors. On a monochrome monitor, unprotected cells appear brighter. Thus, I can tell whether files combined as I intended by quickly scanning the worksheet.

Candy Bair
Cheerleader Supply Co.
Dallas, Tex.

Revisited

Safer BAK erasures

I have an alternative to Douglas Nakakihara's method for erasing BAK files that are automatically created by the DOS EDLIN commands (July 1989, page 125). He wrote a batch file that loads EDLIN, then automatically erases all BAK files in the current directory after he exits from EDLIN. This offers no room for error. What if you make several mistakes while you're editing?

I created a batch file that lets me review my work after I exit from EDLIN, then gives me the option of saving the BAK files rather than erasing them. To create the file, enter the following commands at the DOS prompt:

```
copy con ed.bat
echo off
edlin %1
cls
if not exist *.bak goto :end
echo Now displaying %1
echo ____________________________
type %1
echo ____________________________
echo If you DON'T want to delete the
echo BAK file, press Control-C.
echo Otherwise...
pause
del *.bak
:end
```

Press the F6 key, then press Return to close the file. DOS should display the message, *1 File(s) copied.*

When you want to use EDLIN to edit a file, enter *ed* and the file name at the DOS prompt. The new batch file loads EDLIN and waits until you finish editing. When

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you leave EDLIN the batch file checks for the presence of files with .BAK extensions. If none exist, the batch file stops running and the DOS prompt is displayed. If there are any BAK files in the directory, the batch file displays the contents of the file that you just edited. It then prompts you to press Control-C if you want to retain the BAK files or to strike any key if you want to delete them. If you press Control-C, DOS displays the message *Terminate batch job (Y/N)?*. If you press Y, the batch file does not erase the BAK files and the DOS prompt appears. If you press N, the batch file erases the BAK files and the DOS prompt appears. If you don't press Control-C, the batch file erases all BAK files in the directory when you press any key.

Scott A. Whitney
Whitney Computer Systems
Fountain Valley, Calif.

You can use the L(IST) command to view your edits before you exit from EDLIN. That saves you from having to restart EDLIN to fix any mistakes you discover. On the other hand, those BAK files could prove useful if you discover errors in edited files after you exit from EDLIN. You might not notice an error in an edited CONFIG.SYS file, for example, until you restart your computer. We suggest that you live with the BAK files at least until you're sure that the edited files are okay. Issue the DEL *.BAK command at that point to clean up your disk.

1-2-3 / Symphony

Sort file listings

You've printed several good ideas on DOS's various options for sorting a directory listing. These are all quite useful, but if you're more comfortable working in the spreadsheet than in DOS, there are alternatives.

In *Symphony*, select SERVICES File Table and press Return to accept the current directory or press Escape and enter the directory you want to sort. *Symphony* lets you create a table that lists only worksheet, print, or graph files or a table that lists all files. Select the type of file you want listed, and indicate a cell in an unused part of the worksheet. The resulting table contains three columns. The first column contains the file names in alphabetical order. The second column contains the serial number of the date and time the file was last saved. The last column contains the file size (in bytes). You can sort and manipulate the data in the table as you would any database in *Symphony*. Most of your readers are already familiar with *Symphony*'s sorting options. If they use this technique, they won't need to learn DOS's more cryptic commands.

Dennis Riedinger
Mogadore, Ohio

To generate a file table in *1-2-3* Releases 2.2 and 3.x, select /File Admin Table. These tables contain four columns of data, because the date and time are displayed in separate columns. In *1-2-3* Releases 2.2 and 3.x, you can generate a table that lists only worksheet, print, graph, or linked files or a table that lists all files. You can also limit the list by specifying part of the file name or extension along with a wild-card character, * or ?. For example, if you enter *a*.txt*, all TXT files that begin with the letter A will be listed. In Release 3.x you can also generate a table that lists only active files.

DOS

File Import directory listings

Here's a way to use the DOS TREE command and the *1-2-3* and *Symphony* File Import command to create a file containing a list of directories and their files.

Begin by making sure that the directory that contains DOS is current. To save the list to a file called LIST.PRN in the 123 subdirectory, enter the following command at the C> prompt:

```
tree /f > c:\123\list.prn
```

If you want the file copied to another directory, replace the *123* in the example above with the name of that directory. If you want the file copied to a disk in drive A, replace *c:\123* with *a:*.

The DOS TREE /F command produces a list of all directories, subdirectories, and the files contained in each of them. The > directs the output. In this example the output is directed to the file LIST.PRN. After executing this command, load *1-2-3* or *Symphony* and use the File Import Text command to import the PRN file.

See the example listing at the top of the next column.

The list begins with the files located in the root directory, followed by the directories and their files and the subdirectories and their files. For example, the files located in the 123 directory are listed first, and the files located in each of the subdirectories, FINANCIAL and PERSONAL, are listed next.

```
DIRECTORY PATH LISTING
Files:                  S22         .BAT
                        123         .BAT
                        CONFIG      .SYS
                        AUTOEXEC    .OS2
                        CLOCK01     .SYS
                        AUTOEXEC    .BAT
                        COMMAND     .COM

Path: \123
Sub-directories:        Financial
                        Personal

Files:                  INSTALL     .EXE
                        INSTEXT     .RI
                        INSDISK     .PI
                        123         .EXE
                        INS         .EXE
                        INSTALL     .SCR
                        INSTALL     .RI
                        INSTALL     .DDF
                        LICENSE     .000
                        LOTUS       .EXE

Path: \123\FINANCIAL
Sub-directories:        None

Files:                  YEAREND     .WK3
                        JAN91       .WK3

Path: \123\PERSONAL
Sub-directories:        None

Files:                  PROJECT     .WK3
                        COMSULT     .WK3
```

To maintain an accurate account of files and their disk location, you should update this file regularly.

Hester Spencer
St. Louis, Mo

1-2-3

Database Find shortcut

The Range Search command in *1-2-3* Releases 2.2 and 3.x provides a simple alternative in some cases to Data Query Find operations. Suppose that you wish to find all records that contain a particular string. Rather than set up a Criteria range and create a criterion formula, simply issue the Range Search command. Include the entire database as the range to search, and enter the string that you wish to find.

You can elect to search labels, formulas, or both labels and formulas. When the Range Search command finds your target string, select Next to find the next occur-

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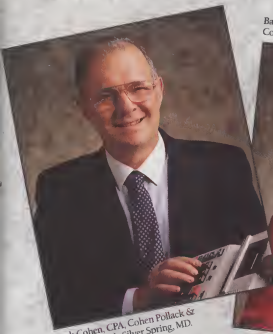

Hank Cohen, CPA, Cohen Pollack & Associates Chtd., Silver Spring, MD.

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rence of the string. Keep selecting Next until you find the desired record. When you select Quit, the Range Search command leaves the cell pointer at the most recently found occurrence of the search string.

Patrick G. Donnelly
Oak State Products Inc.
Wenona, Ill.

1-2-3

Sorting barrier broken

In my office we use *1-2-3* Releases 2, 2.01, 2.2, 3, and 3.1, but most of us use Release 2.*x* and are often limited by its two-level database-sorting. I have found that by retrieving a Release 2.*x* file into Release 3.*x*, I can sort a database by as many fields as required and save the file as a WK1 file. Then a Release 2.*x* user can use the newly sorted database.

Tom Ondrejcak
Hattiesburg, Miss.

In *1-2-3* Release 3.*x*, when you save a file as a WK1 file, you may receive the error message *Incompatible worksheet information lost during saving*. This message appears if the worksheet contains any settings, formats, or features not available in *1-2-3* Release 2.*x*.

1-2-3 / Symphony

Passwords don't protect

If you use the P (password) option to password-protect a worksheet when you save it, keep adequate backup copies. While busybodies can't retrieve a file for which they don't know the password, they can erase the file. All you have to do to destroy a password-protected file is save a blank file with the same file name. This seems like a gaping loophole in the protection system, or maybe I'm doing something wrong.

Grover Turbox
New York Job Development Authority
Albany, N.Y.

You're right. It's next to impossible to protect your files from meddlers who have access to your computer. Even with added security settings, it's still possible to view the contents of a locked worksheet. We suggest that you back up all important files and store them away from your computer.

Many small companies that use minicomputers keep three disks (or tapes). One stays on the system, one goes in a company safe, and the third goes home every night with the company president. This approach should be sufficient protection for data that is stored on a PC.

This material was prepared by Daniel Gasteiger and the Technical Editors, with the help of the Lotus Customer Support staff.

WRITE US Do you have a favorite technique or way of using your Lotus products or of keeping your hardware and software on speaking terms? Share it! We'll send you $50 if we print your letter. Send it to **Good Ideas**, *LOTUS* Magazine, P.O. Box 9123, Cambridge, MA 02139-9123.

LOTUS The good ideas that contain screens are available on disk. See page 1 for details.

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Here's a typical VGA flat-screen. Note dead space at the top and bottom of the display area.

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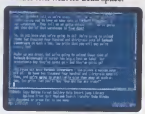
Here's the same screen with UltraVision. You get bigger and bolder text with no dead space.



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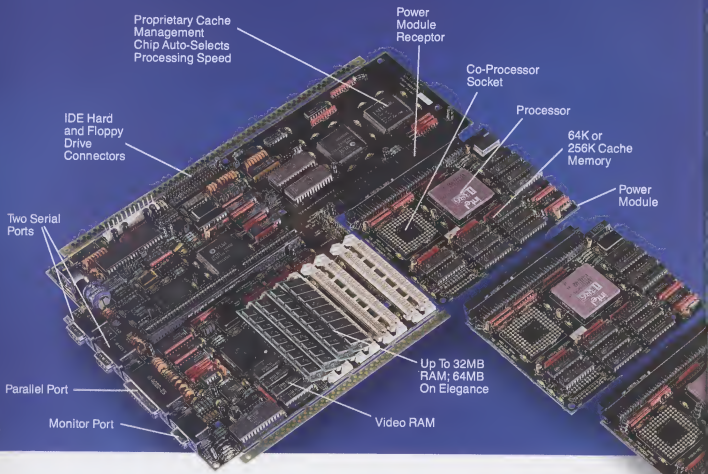

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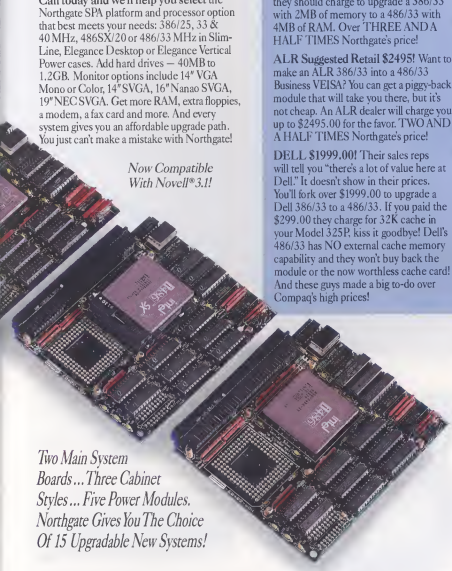

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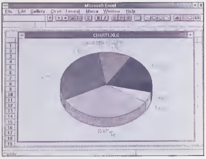

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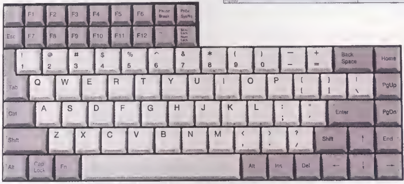

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- System weight 6.1 lbs with battery; AC adapter 0.8 lb.; battery 1.05 lbs.
- 84-key keyboard emulating 101
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- 386SX/20MHz processor
- 80387SX coprocessor support
- 3MB RAM; expands to 5MB
- 20MB hard drive with auto parking; 40MB and 60MB drive options available
- 1.44MB 3.5" floppy drive
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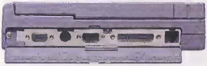

LEFTSIDE CONNECTORS: Behind a hinged side panel, Slim*Lite* has ports for external VGA monitor and keyboard plus a 9-pin serial port, parallel port and phone jack plug.

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Article No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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Graphical Forecasting

Intex updates its *Forecast!* add-in to tap the power of WYSIWYG.

BY TOM CARLTON

Whether you're deciding how many salespeople to hire for the coming season, how many units to produce, or how much advertising to buy, forecasting software can help you find patterns in your business data and project those patterns into the future.

Intex Solutions' *Forecast! GFX* template, an update of its *Forecast!* for *1-2-3* Release 2.*x* and *Symphony*, takes advantage of Release 3.1's WYSIWYG spreadsheet-publishing capabilities.

Like its predecessor, *Forecast! GFX* lets you use time-series and multiple-regression analyses to uncover historical patterns and produce forecasts. But unlike the older package, *Forecast! GFX* consistently displays information simply and cleanly.

You can fit several models to your data and view the summary statistics for each model to see which has the best fit. A new split-screen option lets you integrate graphs into the worksheet. Also improved is the appearance of reports and graphs, many of which you can place directly in a presentation.

Forecast! GFX uncovers historical data patterns to help you produce reliable forecasts.

Choose Your Analysis Weapon

Forecast!'s strength has always been its wide variety of forecasting techniques, and *Forecast! GFX* continues that tradition. You can use time-series techniques to analyze historical patterns and create forecasts based on those patterns. Multiple regression forecasts one variable based on other, independent variables.

Time-series analysis and multiple regression are now combined in the same worksheet, which is a significant change. This makes it much easier to progress from time-series models to multiple-regression models and to use both to develop forecasts for the same data. Unfortunately, time-series analysis, including seasonal adjustment, is disabled after you load the first independent variable for multiple-regression analysis. You must remember to perform time-series analysis and seasonal adjustment before loading independent variables.

Forecast! GFX can perform five types of time-series analysis: seasonal adjustment, linear and nonlinear trend analysis, moving-average analysis, exponential smoothing, and decomposition. Trend analysis supports linear, exponential, hyperbolic, S-curve, and polynomial trends. Hyperbolic trend models, new in this release, are used to analyze data that indicate a decline toward a limit, such as the output of an oil well or the price of a particular model of personal computer.

Time-series forecasts are most useful for short-term projections: for example, forecasting cash receipts for the entire month using the first 10 or 15 days' receipts.

Multiple regression is useful when you have both a dependent variable—such as sales, which can be difficult to forecast directly—and independent variables, such as price, level of advertising, or product quality. Multiple regression describes the dependent variable as a weighted sum of the independent variables.

Forecast! GFX can perform multiple-regression analysis with up to 10 independent variables. In addition to letting you combine and transform the variables using common statistical techniques, *Forecast! GFX* now lets you set up an exponential, hyperbolic, or S-curve relationship between the dependent variable and the first independent variable.

Data Input

You can load data into *Forecast! GFX* from the keyboard or from a named range in another worksheet. Keyboard entry is actually more difficult in *Forecast! GFX* than in the older version. On '286 and 386SX (but not '486) machines, you'll notice a significant lag between the time you press Return to end an entry and the start of the next entry.

Data loaded from other worksheets must be in a single-row or single-column named range. The exception is for multiple regression: *Forecast! GFX* will accept independent variables from a rectangular named range in another worksheet. The software now lets you put the name of the series and its units in the first two cells of the named range or in the first two rows of a block range, so you don't have to remember every variable in the block.

You can easily drop out of *Forecast! GFX* and into *1-2-3*, and back again. This is helpful when you want to name a range of data in another worksheet so that you can load it into the forecaster.

Forecast! GFX makes forecasting accessible to anyone who has had some training in statistics or forecasting. If you have no forecasting background, check out *Forecast! GFX*'s excellent tutorial. It guides you through the process of building several forecasts using both time-series and multiple-regression techniques. After that, the future is yours.

Tom Carlton is a manager of corporate business analysis for a midwestern Fortune 500 company.

IN BRIEF

Forecast! GFX. Version 1.0. Intex Solutions Inc., 161 Highland Ave., Needham, MA 02194, 617-449-6222. Requires *1-2-3* Release 3.1 and 195K of RAM in addition to space for the WYSIWYG add-in. $165. 30-day money-back guarantee. Unlimited free technical support.

The DOS You've Been Waiting For

MS-DOS 5.0 packs more features into less memory.

BY ERIC GREVSTAD

It's been three long years since Microsoft Corp. delivered a major upgrade to its disk operating system, but MS-DOS 5.0 is worth the wait. The latest DOS should be of particular interest to those PC users who said "Thanks, but no thanks" when Microsoft introduced MS-DOS 4.0 in 1988. DOS 5.0, which will be sold as a $99.95 upgrade, is an impressive, across-the-board improvement over its predecessor.

Aside from a few high-profile bugs (fixed in version 4.01), DOS 4.0 was notable chiefly for the unseemly way it hogged precious memory and offered features DOS 3.3 users didn't need. True, it allowed hard-disk partitions bigger than 32 megabytes, but it assumed the PC was a network server and needed 6K of RAM for SHARE.EXE. Yes, it came with an installation program and the MS-DOS shell, a semi-graphical file manager and program launcher. But both were awkward, hardly reason to give up DOS 3.3.

MS-DOS 5.0 is no dud. The shell has been changed from a lame imitation of *XTree* or *The Norton Commander* to a miniature version of *Microsoft Windows* 3.0. Built-in help and undelete functions reduce the need for add-on utilities. A new, full-screen text editor and a BASIC programming environment are luxurious replacements for EDLIN and GW-BASIC.

Best of all, MS-DOS 5.0 requires much less memory, especially on '386 and '486 machines. RAM savings may be minor for users of *1-2-3* Release 3.1, which has its own memory manager, but Release 2.*x* buffs should see dramatic gains. You can load DOS 5.0, a disk cache, a mouse driver, and one or two memory-resident utilities and still have 615K free for programs and data.

ROSS, CULBERT, HOLLAND & LAVERY INC.

When only 640K is available for DOS programs, it's nice to use as little of it as possible for the operating system itself. Here's how much RAM is left after several operating systems with identical CONFIG.SYS files are loaded into the same Arche '486 machine.

Managing Memory

DOS 4.0's Select installation program was ungainly, but 5.0's installation is simple and straightforward. It upgrades your system in minutes without requiring that your hard drive be reformatted; in fact, it leaves your old DOS files intact, giving you the option of restoring your old system or deleting it later.

Though fatter in terms of disk space—the complete operating system and utilities no longer fit on a 1.44-megabyte floppy disk—MS-DOS has gone on a memory diet. Like *Windows* 3.0, DOS 5.0 manages memory above 1 megabyte via an Extended Memory Specification driver called HIMEM.SYS.

You can instruct DOS 5.0 to move much of its own code from conventional memory to the first 64K of extended memory simply by modifying your CONFIG.SYS file so that it includes the driver HIMEM.SYS and the command DOS=HIGH. Detailed instructions in the manual walk you through this process. In *LOTUS*'s tests, this one step boosted *1-2-3* Release 2.2's Worksheet Status report of available RAM from roughly 167K to 196K (see table). And yes, DOS 5.0 lets you use a big hard disk without SHARE.EXE.

If you're a '386 or '486 user whose conventional RAM is crowded with device drivers and terminate-and-stay-resident (TSR) utilities, you can get even more elbow room by teaming HIMEM.SYS with DOS's expanded memory manager, EMM386.EXE.

Like the third-party products *QEMM*

and *386Max*, EMM386.EXE serves two functions. First, it can convert extended RAM into expanded RAM (specifically, EMS 4.0) for those applications that benefit from that memory-switching scheme, such as *1-2-3* Release 2.2. Second, it can create memory blocks in unused areas between 640K and 1 megabyte. DOS 5.0's DeviceHigh and LoadHigh commands let you stash drivers and TSR programs in these areas, freeing up space in the below-640K region.

LOTUS's tests of a prerelease copy of MS-DOS 5.0 revealed a conflict with one EMM386.EXE option: If you use its NOEMS switch, which disables expanded memory in return for an extra 64K of high-loading space, *1-2-3* Release 3.1's built-in memory manager balks and Release 3.1 refuses to load from the DOS prompt.

Otherwise, Release 3.1 runs under DOS 5.0 with no problems. You can use EMM386.EXE without the NOEMS parameter, use HIMEM.SYS alone, or use neither, leaving all extended memory free to maximize Release 3.1's work space. Another alternative is to use the DOS 5.0 drivers, including NOEMS, and start Release 3.1 from *Windows* 3.0 in '386 Enhanced mode. *1-2-3* turns memory handling over to *Windows* in this situation, so it runs without a hitch.

A New View

Besides seeing as much as 100K or more in memory savings, you'll notice a difference in DOS 5.0 as soon as you enter *dir*. The directory listing shows totals for used as well as free disk space and offers new directory options that let you sort a file list, filter files according to attributes, or search for files across subdirectories. Also, if you misplace your manual, help is readily available for all DOS 5.0 commands. For example, entering *dir /?* or *chkdsk /?* summons an appropriate help screen.

The new commands Mirror, Unformat, and Undelete, adopted from Central Point Software's *PC Tools Deluxe*, make DOS mistakes less disastrous. These commands recover accidentally formatted disks or deleted files by saving disk images and tracking deletions. When recycling old disks, you can use a new Format switch to erase previously formatted floppy disks in as little as 10 seconds.

DOSKey, a 4K memory-resident utility, lets you combine DOS commands into macros. You can also use DOSKey to replay commands executed earlier. Pressing the F3 key from the DOS prompt still recalls your last command, but pressing the UpArrow key now lets you review your last dozen or so steps.

QBASIC, a mini-version of Microsoft's popular QuickBASIC programming language, bests GW-BASIC by offering pull-down menus, no line numbers, and debug and trace options to assist programmers. QBASIC is also the basis for Edit, an ASCII text editor that provides you with cut-and-paste editing and search-and-replace functions. It's no word processor, but compared with the horrible EDLIN, it looks like *Ami Pro*.

Finally, even people who don't like DOS shells, including those who despised DOS 4.0's, may be won over by 5.0's MS-DOS shell, which is faster, smaller, and more like *Windows* 3.0 than its predecessor. Running in either text or graphics mode, the mouse-controllable 5K shell makes it easy to navigate directories, copy or delete files, or launch programs, all without a glimpse of the system prompt. The graphics mode displays directories as folder icons instead of brackets.

You can also install your favorite applications on a menu and switch among them by using Task Swapper, an option that lets you start a program and later suspend it while you switch back to the shell and launch another application. Task Swapper is a one-at-a-time task-switcher, not a multitasking environment, and it's not as sophisticated as third-party switchers, such as *Software Carousel*. Still, it's a step up from the dull old DOS prompt.

A Dynamic New DOS

Clearly, Microsoft is using MS-DOS 5.0 and its shell to introduce and support *Windows* and to dampen sales of third-party utilities and memory managers. DOS 5.0 still leaves room for a crop of wish lists and add-ons. Wouldn't we all love DOS, *PC Tools*, and *Norton Utilities* rolled into one neat, memory-efficient operating system? Nonetheless, it's an upgrade every '386 and '486 user will want. If you were one of the PC faithful who thought DOS 4.0 was like New Coke, we have terrific news: MS-DOS 5.0 is the real thing. ■

Eric Grevstad is a free-lance writer and long-time computer-magazine contributor based in New Hampshire.

THE OTHER DOS 5.0

An enhanced operating system with on-line help, thrifty memory management, command-line recall, a full-screen text editor, and the 5.0 surname? Don't think Microsoft; think Digital Research Inc. DRI has been shipping DR DOS 5.0, its MS-DOS–compatible operating system, for a year. Just like MS-DOS 5.0, DR DOS lets you move its code and device drivers out of 640K, search for files in subdirectories, and set up large disk partitions—all for only $79.

DR DOS lacks undelete and unformat functions, and its ViewMAX interface (based on the old *Gem Desktop*) is no match for MS-DOS 5.0's spiffy new shell. Even so, DR DOS lets you move files and rename directories from the command line without a shell, tap into laptop file-transfer and cursor-changing utilities, and create multiple configurations in CONFIG.SYS, loading or skipping individual drivers at system startup.

DR DOS had the upper hand over MS-DOS 4.0. MS-DOS 5.0 is a heavy counterattack but not a knockout blow. DRI, which has vowed to stay one step ahead of its competition, plans to release a new version of DR DOS later this year. If the past is any guide, no sooner will DR DOS 6.0 appear than Microsoft will try to distract customers by dropping hints about the next version of MS-DOS. Do yourself a favor and give DR DOS the attention it deserves. —*E. G.*

IN BRIEF

MS-DOS 5.0. Microsoft Corp., One Microsoft Way, Redmond, WA 98052; 800-426-9400. Upgrade, $99.95; master license pack, $79.95. Requires 512K of RAM and 1 megabyte of hard-disk space.

Scanning Your Input Options

OCR software and hand-held scanners pack a powerful punch for fast, inexpensive data input.

BY PETER G. AITKEN

SUZETTE BARBIER

If you're like most computer users, you spend a lot of time keying data into your PC. But much of that information already exists in printed form, as printouts, books, or periodicals. If only you could easily and inexpensively convert printed numbers and text to a format your spreadsheet, word processor, or database would accept.

Now you can, thanks to optical-character-recognition (OCR) software and a new generation of hand-held scanners. OCR software examines scanned files, identifies individual characters, and converts them to a form PC applications can read.

Until recently, OCR software ran only on full-page scanners, which cost at least $1,000. Now OCR programs are being bundled with hand-held scanners. For less than $500, you get scanning power that takes up little more desk space than a mouse but lets you import numbers from financial reports or spreadsheet printouts without rekeying.

All three gray-scale, DOS-based OCR programs reviewed by *LOTUS* magazine—Logitech Inc.'s *CatchWord*, Marstek Inc.'s *Pro-Reader*, and OCR Systems' *Read-Right Personal*—recognize numbers and text with good to excellent results. *CatchWord* and *Pro-Reader*, which work only with scanners from their makers, were tested with Logitech's ScanMan Plus scanner and Marstek's Mars 800 scanner, respectively. *ReadRight Personal*, which can use a variety of hand-held units, was tested with The Complete PC's Complete Half-Page Scanner/400.

A new contender in the market—Typist, from Caere Corp. (Los Gatos, Calif.)—arrived too late for testing. The approach of this $595 scanner/software package differs from that of the programs in this review. The software is memory-resident; you install it and then run your application. When you scan text using Caere's dedicated half-page scanner, the recognition software converts the image and enters the text directly into your application.

Of the three programs reviewed here, *ReadRight Personal* stands out, particularly because it can format scanned data into *1-2-3* WK1 files. In addition, *ReadRight*'s support for different scanners, wide variety of output-file formats, ability to recognize text attributes, powerful page-decomposition features, and excellent manual give it the edge.

Accuracy Is All

If too many mistakes are introduced, by either a poor scan or inaccurate OCR software, you'll spend more time correcting errors than you saved by scanning in the first place. Input quality is directly related to the state of the original document and the accuracy of the scan.

There's not much you can do about the original document. Most glossy-paper magazines, laser-printer output, good-quality dot-matrix printouts, and clean photocopies should yield successful results. You'll run into trouble, however, with newspapers, third-generation photocopies, and faint dot-matrix printouts. None of the programs reviewed here can handle handwritten characters.

> IF TOO MANY MISTAKES ARE INTRODUCED, YOU'LL SPEND MORE TIME CORRECTING ERRORS THAN YOU SAVED BY SCANNING.

Hand scanners are not quite as easy to use as their full-page brethren, but most people will need less than a half hour to become familiar enough with their operation to produce excellent results—in some cases, scanned spreadsheet data was completely error-free. The speed and straightness of scanner movement is important. The software packages reviewed here all accept slightly skewed lines of text, but too much tilt will cause problems.

The typical hand unit can scan an image four inches wide, clearly not wide enough for a page of text. When text or numbers run across the full width of a page, you scan a page in two or more overlapping vertical passes. The OCR software automatically recreates the full body of the text by searching for repeated character strings and joining the segments into one document.

CatchWord is limited to only two vertical strips, but this is adequate for most pages. *Pro-Reader* and *ReadRight Personal* let you make three or more passes. For very wide documents, *Pro-Reader* lets you scan as many as nine overlapping strips.

Numbers or text in columns can be scanned one column at a time. All three packages isolate each column before the recognition process and later string the columns together in the proper sequence.

Each program offers automatic page decomposition, a process that separates text from nontext elements, such as photographs or line art. *ReadRight Personal* and *Pro-Reader* go further, letting you fine-tune the process manually if you want to exclude certain text regions from the recognition process.

✓ ✓ ✓

	CatchWord	Pro-Reader	ReadRight Personal
Software alone	$249	NA	$249
Bundled with scanner	$499	$459	$449
Text size read	6-20 points	6-20 points	4-16 points
RAM required	450K	640K	640K
File formats supported			
ASCII	yes	yes	yes
Wordstar	yes	yes	yes
1-2-3	no	no	yes
Microsoft Excel	no	no	yes
WordPerfect	yes	yes	yes
Microsoft Word	yes	no	yes
Comma-delimited	yes	no	yes
XyWrite	yes	no	yes
dBase	no	no	yes
DCA-RFT	no	no	yes
MultiMate	yes	no	no
CanoWriter	no	no	yes

The programs reviewed here take two approaches to optical character recognition. *CatchWord* and *ReadRight Personal* use omnifont technology, which recognizes any standard font or type size without having to be trained.

Pro-Reader uses an alternate technique, called pattern or matrix matching. This method matches the image of each character to a series of models stored in a font file. You must train the program for each new font and type size, although this can be a boon when trying to scan an uncommon typeface or character set.

Unique to *CatchWord* is its ability to recognize foreign alphabets—the program recognizes English, French, German, Italian, and Spanish characters. Within each language, characters that have accents, such as ü, é, and ç, are produced as special ASCII codes.

Even under the best of circumstances, an OCR program will make occasional errors. One type of error is the misidentification of a character—the numeral 1, for example, might be misread as the letter *l*. The only way to catch these errors is to proofread the final text. You must be particularly careful when scanning numbers, because a misspelled word is easier to identify than, for example, a 1 mistaken for a 7. The other type of error is the failure to identify a character at all. In this case, the software places a missing-character symbol—an ampersand, for example—in the output file.

CatchWord gives you ample opportunity to correct mistakes. In interactive mode, the program shows you the bit map for each unrecognized character and prompts you to enter the proper character. *CatchWord* then produces the file in ASCII form, at which point you can use the built-in editor to make further corrections. Data is converted to your specified format when you save the file to disk.

Pro-Reader's correction step acts as a de facto training step, as well. The software automatically shows you images it failed to recognize and asks for the correct characters, which it then stores as a new pattern. Like *CatchWord*, *Pro-Reader* converts the file to your specified format when you save it.

ReadRight Personal lacks a built-in text editor, so you cannot correct text before saving it. You must specify an output file name and format before you start scanning. The program performs recognition and immediately writes the resulting text data to the file, offering no opportunity for editing.

A Personal Decision

Of the three programs, *ReadRight Personal* supports the richest variety of file formats, including *1-2-3*, *dBase*, and *Microsoft Excel*. In testing the *1-2-3* format, we scanned three columns by eight rows of numbers into *ReadRight Personal*. The software recognized discrete numbers without problems and produced a WK1 file that can be read into *1-2-3* like any other worksheet. *Pro-Reader* and *CatchWord* translate data into an ASCII file, which you then must import by using *1-2-3*'s File Import Numbers command.

Except for its lack of a text editor, *ReadRight Personal* is the most flexible of the three programs. It works with several popular brands of scanners, supports the widest variety of output-file formats, and has the best manual. Among the software's unique features is its ability to recognize and retain character and page attributes, such as boldface, underlining, tabs, margins, and columns.

If you need to scan foreign-language text, consider *CatchWord*. Its support for special characters can be a great help. For everyone else, *ReadRight Personal* takes the blue ribbon.

Peter G. Aitken is an associate medical research professor at a major eastern university.

IN BRIEF

CatchWord 1.0. Logitech Inc., 6505 Kaiser Dr., Fremont, CA 94555; 415-795-8500. Works with Logitech's ScanMan scanners.

Pro-Reader 1.55. Marstek Inc., 17795-F Skypark Circle, Irvine, CA 92714; 714-833-7740. Works with Marstek's Mars 128, Mars 105 and 105 Plus, and Mars 800 scanners.

ReadRight Personal 1.0. OCR Systems, 1800 Byberry Rd., Suite 1405, Huntingdon Valley, PA 19006; 215-938-7460. Works with Logitech's ScanMan, The Complete PC's Complete Half-Page Scanner/400, DFI Inc.'s Handy Scanner 3000 Plus, and Marstek's Mars 105 and Mars 128 scanners.

Don't Touch That Laser!

For some jobs, 24-pin dot-matrix printers outperform laser printers. Epson, NEC, and Panasonic stand out in a crowded field.

BY TRACY MAYOR

REVIEW *of* REVIEWS

You say your budget's strapped and you need to print extra-large spreadsheets, multipart forms, and high-volume reports? Forget that HP LaserJet; a dot-matrix printer is the machine for you.

As prices for laser printers sink below $1,000, many offices are relegating their dot-matrix units to the back closet, but the machines are far from obsolete. True, laser printers can noiselessly produce higher-quality output, but their paper-handling options remain limited. Laser printers can't handle heavy stock, print carbon forms, or accept fan-fold or wide-gauge paper. Dot-matrix printers can. For very large print jobs, such as database reports, lasers are less dependable and more costly per page than dot-matrix machines. As *Government Computer News* reported, "The dot-matrix machine still has a secure foothold in many federal offices for printing large spreadsheets and database reports."

And there's price to consider. Manufacturers of 24-pin dot-matrix machines are fighting the influx of ever-cheaper lasers by offering faster, feature-laden machines at rock-bottom prices. The new IBM Proprinter 24P, for example, boasts letter-quality type, seven resident fonts, and a 32K print buffer for $499. Panasonic Communications and Systems Co. recently rolled out the KX-P1124i, which offers "super letter quality" type, seven fonts, and an LCD front panel—all at the older model's price of $499.95. As *PC Magazine* wrote in a roundup of 121 printers, "Lasers may be sexy. . .but when the bottom line *is* the bottom line, dot matrix printers often come out ahead."

Serviceable, near-letter-quality machines can now be had for as little as $300. *PC Magazine* singled out Citizen America Corp.'s GSX-140 as a bargain at its $499 list price (street prices run about $300), and Citizen announced at Comdex/Spring the GSX-130, which carries a $399 list price. *PC Sources* gave a thumbs up to Star Micronics America's NX-2420 Multi-Font ($449 list, about $280 mail order).

If performance is more important to you than rock-bottom prices, compare speed ratings. Dot-matrix printers are clocked in characters per second (cps), or the number of characters they can print in a one-second burst without line feeds, carriage returns, fancy fonts, or other embellishments.

EXECUTIVE SUMMARY

Printer	Particulars	The critics say . . .
LQ-850 and LQ-1050 Epson America	The 850 and wide-carriage 1050 have long been praised for their text quality, speed, and reliability. Epson plans to release by press time new models that sport built-in scalable fonts and a revamped printer language.	"The LQ-850 and LQ-1050 are arguably two of the best 24-pin printers on the market today." —*PC Magazine* "The Epson LQ-1050 seized top scores from buyers in. . .software compatibility and hardware compatibility." —*PC Week*
Pinwriter P6200 NEC Technologies	Rugged construction, a whopping 80K print buffer, good print quality, and superior forms handling have garnered accolades for the P6200, which also offers a $119 color option.	"Print quality is as good as 24-pin dot matrix gets. . . No other office dot-matrix machine can begin to match its buffer capacity. . . The. . .P6200 proves there's life in dot-matrix printers yet." —*PC Computing*
KX Series Panasonic Communications and Systems Co.	Print quality, paper handling, and support for configuration macros are hallmarks of the dot-matrix printers in Panasonic's KX line, which includes the entry-level P1123, the beefed-up P1124i, and the wide-carriage KX-P1624.	"Few dot-matrix printers match the KX-P1624's list of standard features." —*Byte* "In both overall reliability and performance, Panasonic . . .came out as the top finisher." —*PC Week*

✓✓✓

As *Byte* advised, "Use these [cps] ratings to compare the speed of various printers, but don't expect a printer rated at 300 cps to print a 10,000-character document in 33 seconds." Average speeds range between 200 and 400 cps. When two numbers are listed, the faster speed is for draft printouts. Letter-quality output, which usually requires two passes of the printhead, takes longer.

A print buffer improves overall productivity by allowing you to get back to work while printing continues. Most models include buffers between 8K and 32K; NEC Technologies' Pinwriter P6200 and P6300 stand out with an 80K buffer.

Epson America, Okidata, and Seikosha America are among manufacturers that offer heavy-duty, high-speed printers for true speed freaks. Hewlett-Packard Co.'s RuggedWriter 480, for example, churns out 480 cps. Okidata's new Microline 393C Plus produces 520 cps. You pay for speed, however. The RuggedWriter carries a $1,695 list price, and the Microline costs $1,599.

Important as speed and price are, most buyers base their decision on a printer's features—among them flexible paper handling, LCD interfaces, wide carriages, built-in fonts, and color-print options. "Don't get hung up on small differences in printer speed or price," *PC Magazine* counseled. "You'll find it's worth a few dollars to get a well-thought-out control panel or intelligent paper handling."

Evaluate your paper needs before you buy. Do you use fan-fold paper, cut sheets, or both? Most units now include a "paper-park" feature that lets you print on a single sheet without enduring the time-consuming process of disengaging your fan-fold paper or forms. Many companies offer a cut-sheet bin for larger jobs as an option, at an additional charge. A cut-sheet feeder for IBM's Proprinter 24P, for example, costs $199.

Traditionally, dot-matrix printers had tractors that pulled paper through the machine, a setup that's better for labels, heavy stock, and perforated forms than it is for single sheets. Push tractors, now standard on many machines, allow manufacturers to include features such as paper parking and paper tear-off so that you won't waste a blank sheet of paper each time you print. Some printers come with tractors that can push or pull. "The built-in tractor. . .is easy to adjust for either method," wrote *PC Sources* of the Panasonic KX P1624.

Pay attention to the way you communicate with the printer. In nearly all cases, DIP switches have been replaced with a configuration menu, either a printed list of options or an LCD panel. "For true clarity and ease of use, you can't beat the LCD interface," *Byte* said. The front-panel LCD grid of Panasonic's KX-P1624 printer won praise from more than one reviewer, particularly for its three macros that let you store and reuse configuration settings.

Special-Interest Stories

Dot-matrix color, once infamous for streaks and bands, has improved somewhat. Many lower-end printers can be retrofitted for color with a color driver motor and ribbon; higher-end models, such as the NEC Pinwriter P6200, need only a color ribbon and a pop-in base. *PC Magazine* liked the Citizen GSX-140, which "produced outstanding color graphics with hardly any distortion in the primary or pastel colors," and the Epson LQ-860, which produced "vivid colors with no problems in registration."

Finally, business travelers should look into Seikosha's new LT-20, a 5.9-pound printer that fits under standard notebook PCs. Although *PC Week* found the LT-20's print quality inconsistent, *PC Computing* called its output "clean enough for informal charts and drafts." Both publications found the $499 unit worthy as a low-cost option for on-the-road printing. ■

Rowland Aertker provided research assistance for this article.

Resources

Byte, April, December 1990

Computer Reseller News/Computer Retail Week, February 4, March 18, April 15, 1991

Government Computer News, October 1, 1990

InfoWorld, April 23, 1990; April 29, 1991

The New York Times, March 5, 1991

PC Computing, September 1990; May 1991

PC Magazine, June 12, September 25, November 13, 1990; March 12, April 16, 1991

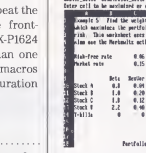
PC Sources, October, November, December 1990; January, February, March 1991

PC Week, August 27, 1990; March 18, 1991

WHAT-IF SOLVER

Solver Power For 1-2-3 Release 2.x and Symphony

Add the power of "solver" technology to the 1-2-3 version you already own! *What-If Solver* gives you optimization powers like those in 1-2-3/W and 1-2-3 3.1 Plus, with ten times the speed and 1/10th the memory. *And you don't have to know any mathematics or special terminology to use it!*



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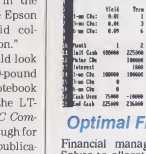

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Here's what the experts think: What-If Solver won *PC Magazine Editors' Choice* in April 1991 and *LOTUS Magazine's Best Add-In* award in December 1990.

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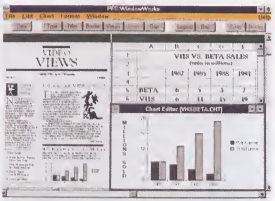
CIRCLE 119 ON READER SERVICE CARD

PFS: WindowWorks:
Integrated Software for Windows

We've been waiting a long time for someone to provide a PC-based integrated software package as good as *Microsoft Works* for the Macintosh. For *Windows* users, the wait may be over.

Spinnaker Software Corp., known for its *Eight-in-One* and *PFS: First Choice* integrated packages for DOS, is the first company to offer such a program for *Microsoft Windows* 3.0. The $199 *PFS: WindowWorks* includes modules that handle word-processing, spreadsheet, telecommunications, graphics, and database functions. The package is ideal for *1-2-3* users who want to supplement their office software with *Windows* on a home PC.



PFS: WindowWorks provides automatic hotlinks among its eight business applications.

WindowWorks' dominant application is its WYSIWYG word processor, which includes most of the presentation and printing features you would expect in a *Windows* word processor. Though not designed for long, book-quality documents, the word processor does offer a 60,000-word spelling checker, a thesaurus, manual kerning, rudimentary drawing tools, a simple outliner, and multiple columns.

Many of these features are included in less expensive *Windows* word processors, such as Symantec Corp.'s $149 *JustWrite*, but *WindowWorks*' raft of additional features make such cost comparisons meaningless. Exhibit A: *WindowWorks* provides hotlinks between word-processing documents and charts, spreadsheets, and databases. You can easily incorporate data from another module into your document, and that information is updated automatically whenever you make changes to your data.

WindowWorks allows direct import and export of WKS and WK1 spreadsheet files—a critical concern for those who use *1-2-3* at the office. The package's 10,000-column-by-30,000-row spreadsheet provides more than 40 financial, statistical, mathematical, and date functions that are roughly equivalent to those in *1-2-3*. Although recalculation takes a bit longer than *1-2-3* users are accustomed to, it's tolerable for most tasks. You won't want to crunch a 100-column-by-200-row consolidated budget in *WindowWorks*, but you can easily use it to update a smaller departmental forecast or a home-budgeting template.

You create business charts by selecting a range of spreadsheet cells and pasting them into the *WindowWorks* chart editor. Automatic linking of the data and the chart means that subsequent changes in the spreadsheet are reflected in the chart. Or you can enter data manually into the *WindowWorks* data editor. Nine chart types, combined with numerous tools to alter details such as fonts, scaling, and borders, make this a handy module.

The *WindowWorks* database module, which handles as many as 32,000 records, accepts *dBase*-compatible DBF files. Unfortunately, *WindowWorks* makes things a bit difficult by failing to display a complete DBF database description before you import data. You must resort to pencil and paper to note a DBF' definition, including field names and lengths, and then enter those items into the new database definition. After that, you can import the records and create up to three index files to speed up record selection. The database report writer creates as many as 10 report formats for each database. You can also use database information to create form letters with the word-processing module or produce labels with the label-making module.

The package's simple but effective telecommunications module, which supports Xmodem and Ymodem file transfers, works with just about any bulletin board or on-line service. Integration with the word processor makes it easy to create or edit text files from a communications session.

Two offbeat but useful *WindowWorks* modules are the label maker and the address book. The address book is a preformatted database that helps you keep track of contacts. The label maker lets you print address labels from either the database or the address book. You can create custom labels and select ranges of records for printing.

This elegantly integrated package is designed for those who need a little bit of everything to get a lot of things done. If you spend most of the day immersed in a stand-alone spreadsheet, database, or graphics program, *PFS: WindowWorks* may not be the best application for you. Still, though none of the package's modules is very impressive in itself, jointly they lend credence to the notion that the whole is greater than the sum of its parts.

—*Garry Ray*

PFS:WindowWorks. Spinnaker Software Corp., 201 Broadway, Cambridge, MA 02139; 617-494-1200. Requires *Microsoft Windows* 3.0. $199.

CIRCLE 1 ON READER SERVICE CARD

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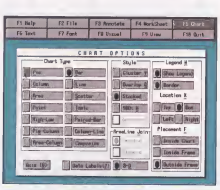
QuickGraph Plus: Cheap and Easy Charting

Ever set out to create a business graphic, only to become hopelessly tangled in X, Y, and Z axes, font sizing and styling, and label positioning?

If so, take heart. Sumak Enterprises Inc. has released a new incarnation of *QuickGraph*, its high-powered business-charting package. *QuickGraph Plus*, available for either DOS or *Microsoft Windows*, is a simple but potent program aimed at those who want the power of images but can't spare the time to develop their graphic-designer skills.

The two versions of *QuickGraph Plus* are functionally identical, and both rely on a mouse-driven, graphical user interface (GUI) for simple operation. The DOS version has a proprietary interface that incorporates buttons, scrolling windows, and other common GUI elements. The *Windows* version operates as a conventional *Windows* program.

QuickGraph Plus is both easy to use and sophisticated, thanks to its graphical interface and the sensible positioning of data-entry fields near the appropriate buttons and pick boxes. For example, the text-entry fields for creating chart titles, subtitles, and X and Y labels reside on the same screen, next to each other. To create



QuickGraph Plus has a proprietary graphical user interface that provides easy access to its functions, and it comes in both DOS and *Windows* versions.

these four major chart elements, you simply enter four text items and press a function key. The updated chart appears instantly.

If you want more sophistication, *QuickGraph Plus* won't hold you back. The program offers more than 10 chart styles, including high-low-close-open, bar, line, pie, and area charts. Bubble charts are also available for comparing numeric data by magnitude. Most chart styles can be enhanced with 3-D data representations, and you always have access to finer controls, such as border, line, and fill patterns and colors.

QuickGraph Plus includes features uncommon in its price range. It prints long, horizontal charts sideways, incorporates multiple charts on one page, and offers data import and export capabilities. The program accepts *1-2-3*, *dBase*, and text files directly and includes a small, 15-column-by-150-row spreadsheet for data editing. The Browse mode lets you view a data file before importing it, and you can also link charts to external files, such as a *1-2-3* worksheet. If you so specify, a linked chart will be automatically updated with data from the external, disk-based data file each time you open the chart. *QuickGraph Plus* exports charts in PCX, TIFF, WPG, or PIX formats.

If you want better charts than *1-2-3* produces but don't want to lose your momentum, *QuickGraph Plus* may be the answer. Its simple design and accessible user interface will have you charting in no time. —*G. R.*

QuickGraph Plus. Sumak Enterprises Inc., 39 Dawson Dr., Sudbury, MA 01776; 508-443-5970. Requires *Microsoft Windows* 3.0 or DOS 2.0, and 640K of RAM. $149.95.

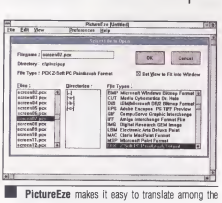
CIRCLE 2 ON READER SERVICE CARD

PictureEze: Translate Graphics Files

A picture may be worth a thousand words, but it's worth nothing if you can't see it. To prevent such a tragedy, Application Techniques Inc. has developed *PictureEze*, a *Microsoft Windows* application that handles some of your graphics dirty work by translating among more than 20 graphics file formats for PCs and Macintoshes.

For example, *PictureEze* lets you easily convert a *Windows* bit-map (BMP) file to an Encapsulated PostScript (EPS) or Claris MacPaint (MAC) format. The program also provides a few rudimentary manipulation tools that let you globally revise images by cropping, shading, and scaling.

Translating a file from one format to another couldn't be simpler. After starting *PictureEze*, select the file that you need to convert by using an input file window, which automatically displays all



PictureEze makes it easy to translate among the top 20 graphics file formats for PCs.

files with a particular extension. If you are working with *WordPerfect* graphics files, for example, the *PictureEze* window displays all such files from whatever disk directory you specify.

Once you've loaded an image, *PictureEze* allows you to make global changes. From within the Effects menu you can crop the image, rescale it, or adjust the intensity of color and shading. You can also rotate the image in 90-degree increments or convert it to a mirror image of the original, even as it rotates.

When the image wins your approval, you can save it to disk in a completely different file format. *PictureEze* lists more than 75 applications for which the image can be saved, including *PC Paintbrush*, *PageMaker*, and *CorelDraw*. Alternatively, you can save the file as one of 20 standard picture formats, including GIF, PCX, and EPS.

PictureEze may not be the glitziest *Windows* program around, but it will assist anyone doing graphics work. —*G. R.*

PictureEze. Application Techniques Inc., 10 Lomar Dr., Pepperell, MA 01463; 508-433-5201. $149.

CIRCLE 3 ON READER SERVICE CARD

Hollywood: Presentations with Panache

If you've ever used your PC to create a slide show, an overhead presentation, or a set of handouts to accompany a speech, you know the hazards involved. You have to juggle your word processor with your graphics software and your spreadsheet to achieve the right effect. IBM's *Hollywood* package could put a quick end to such acrobatics.

Hollywood, a *Microsoft Windows* 3.0 application, includes just about every tool you'll ever need to create a presentation. It has a table editor for numeric data, a word processor for text, and an outliner that produces organizational diagrams and snappy, bulleted-text charts. In addition, a business-graphics module features warm links to external *1-2-3* Release 2.1 and 2.2 spreadsheets so that charts are updated whenever they are loaded, and *Hollywood*'s drawing tool frees you from having to invoke an external freehand graphics program. IBM didn't skimp on sophisticated presentation tools–*Hollywood* includes fading and transition effects to keep an audience mesmerized.

Hollywood reads *1-2-3* files to create business graphics for presentations.

The package works with many graphic file formats, including PCX, TIFF, and GIF, and also offers a driver and software that let you create slide files in the popular MagiCorp format. Save your presentation as a MagiCorp file, send it over the telephone lines to MagiCorp for processing, and you'll have a complete slide presentation in days, at a price that's hard to beat.

Hollywood's editing tools will impress the most jaded corporate art department. Master pages ensure that each page of a presentation conforms to the designated style. For example, you can use corporate colors for all frames and backgrounds and place the corporate logo on every page of the presentation. *Hollywood*'s multipage viewing mode lets you place up to nine thumbnail samples of a presentation on-screen simultaneously, to ease sequence editing.

If *Hollywood* had any more features and power, you'd call it the be-all and end-all of presentation software–which may be a better name than what's currently on the box.

–G.R.

Hollywood. IBM Desktop Software, 472 Wheeler Farms Rd., Milford, CT 06460; 800-426-7699. Requires *Microsoft Windows* 3.0. $495.

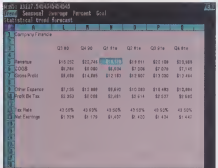
CIRCLE 4 ON READER SERVICE CARD

Geneva Financial Forecasting: Goal Seeking for Release 3.1

If forecasting conjures up visions of financial seers hunkered over Box-Jenkins analyses and classical decompositions, Pizzano & Co. is out to change your perception. The company's *Geneva Financial Forecasting* add-in for *1-2-3* Release 3.1 offers a simpler, real-world method of predicting the future.

Financial Forecasting offers five tools to help managers, financial officers, and other forward-looking businesspeople make practical predictions based on historical data. It doesn't have the statistical and analytical power of larger forecasting packages, but it doesn't require the massive amounts of data such packages need to achieve statistical validity. *Financial Forecasting* works with as few as six periods of financial data, so you can derive forecasts from the last six weeks, the last six months, or the last six years.

The add-in handles five types of forecasts: linear trendlines, seasonal trendlines, percentage growths and declines, goal seeking, and averages. To use any of them, you simply follow the three or four steps needed to generate a forecast.



Geneva Financial Forecasting produces business forecasts from as few as six periods of data.

The trendlines function performs linear regression on historical data, predicting as many future periods as you want. For example, you could use the last 12 quarters of actual results from your profit-and-loss statement to predict results in the next four quarters. Or you could forecast next year's hiring requirements based on anticipated growth in sales. The seasonal-trendlines function works in much the same way but breaks your historical data into periodic chunks so that the final forecast accounts for varying performance in cyclical periods, such as months, quarters, or days of the week.

Financial Forecasting's goal-seeking function proportionally computes cell values to meet a goal value. Average and percentage-growth forecasts perform comparatively simple operations on your data, but like all of the package's functions, they can be applied to one or more worksheets with hundreds of rows and columns each. Computations are always performed as a single batch operation.

At $495, *Financial Forecasting* may seem expensive compared with other forecasting software. But for those who need reliable numbers based on scanty data, it could save a lot of time and money.

–G.R.

Geneva Financial Forecasting. Pizzano & Co., 800 W. Cummings Park, Woburn, MA 01801; 617-935-7122. Requires *1-2-3* Release 3.1 and 2 megabytes of RAM. A version is available for Release 3. $495.

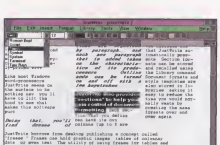
CIRCLE 5 ON READER SERVICE CARD

JustWrite: A Feature-Packed *Windows* Word Processor

The advent of *Microsoft Windows* 3.0 has unleashed a torrent of new word-processing programs. Symantec Corp.'s *JustWrite*, released in April, is an easy-to-use package broad enough to provide something for everyone, yet moderately priced at $199. *JustWrite* has dozens of features that shouldn't be available in a package this cheap.

First, there's an integrated outliner with seven levels of indentation. Outline items are organized by paragraph, and each paragraph that you add takes on the characteristics of its predecessors. You can turn the outline mode on and off with a few keystrokes.

JustWrite also helps you gain control of document formatting by letting you define sections that have their own outlines, headers, footers, and up to eight columns. No longer must you waste time inserting commands or format bars throughout your file. You simply choose Insert Section from the menu and respond to the dialog box that automatically appears. You can store and recall section formats by using the Library command. Document formats and style templates are also stored in libraries, making it easy to reduce the time wasted in recreating formats.



JustWrite provides outlining, table editing, and the ability to control document formatting by sections.

JustWrite borrows from desktop publishing a concept called "frames." Frames hold graphic images, columns of data, or text, and separate graphic, table, and text editors allow you to make changes to framed items. This approach lets you edit the contents of a frame without affecting anything else in the document. For example, you can crop a graphic or revise the layout of a table without disrupting the overall layout of the document in which they appear. Unfortunately, the table editor does not currently read *1-2-3* files, although company officials say that they plan to head in that direction.

Many *Windows* word processors import various file formats, but few do it as easily as *JustWrite*. When *JustWrite* encounters an unknown format, it presents a dialog box that asks which type it is. Thereafter, the program saves the file in its native format until you tell it otherwise. *JustWrite* also has a mail-merge facility that reads *dBase* and Q&A database files. —*G.R.*

JustWrite. Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014-2132; 408-253-2132. Requires *Microsoft Windows* 3.0. $199.

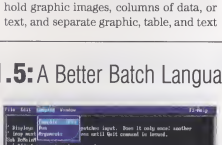
CIRCLE 6 ON READER SERVICE CARD

Builder 1.5: A Better Batch Language for DOS

There's probably nothing more vexing about DOS than its arcane and inadequate batch language. Other operating systems, such as Unix and Digital Equipment Corp.'s VMS, offer a rich set of commands for manipulating files, presenting information on the display, processing keyboard input, and handling long sequences of repetitive keystrokes. Compared with these systems, DOS has a paltry group of commands that tantalize but don't really deliver substantial programming potency.

Builder 1.5, an enhanced MS-DOS batch-programming language from Hyperkinetix, supplies more than 100 batch commands, plus a compiler that creates COM programs when a project is completed. A simple text editor with pull-down menus welds the compiler and the commands together.

Builder 1.0 was good, but *Builder* 1.5 is great. The enriched language of the updated version handles file input and output so that you can get into disk files and grab specific lines of text, or append new material to the file. New string commands make it easy to compare one text string with another, which is helpful if you're writing a *Builder* program to get input from the keyboard.



Builder 1.5 combines more than 100 batch commands with an integrated compiler and text editor. The result is executable batch files.

If you create installation programs for other users, or if you need to run programs at a specific hour of the day, use *Builder*. The new version has a bevy of commands for checking the system date and time and for examining the state of expanded memory, extended memory, the DOS environment, your CPU type, and your system's installed input/output adapters. Such facilities make it easy to develop simple installation programs for *1-2-3* templates. With *Builder*, you can check the system before the installation and inform the user that more memory might be needed to run the template. The Sleep command lets you suspend computer operation for a specified period or until a key is pressed.

Hyperkinetix has beefed up *Builder*'s user interface by adding more commands to the text editor's menus. You can compile or run a *Builder* program from within the editor and add command-line options before the program runs, which are useful for testing a program.

If you use DOS batch files, do yourself a favor and buy *Builder* 1.5. —*G.R.*

Builder 1.5. Hyperkinetix, 615 N. Polar Ave., Orange, CA 92667; 714-935-0823. $149.95; upgrade from *Builder* 1.0, $37.50.

CIRCLE 7 ON READER SERVICE CARD

BUSINESS, FINANCE

★ Business Resource Software of Austin, Tex., has introduced **Plan Write**, a $99.95 program with ready-made outlines, a word processor, spreadsheets, and sample business plans. The program works alone or in conjunction with the company's *Business Insight* analysis tool. 800-423-1228.

CIRCLE 8 ON READER SERVICE CARD

★ Business valuations can be fully documented and made simpler with **Value Express**, ValueSource's $195 program that provides Proof of Valuations based on hypothetical purchase of a business at a given cost. The San Diego company has also included in the program facilities to analyze deal structures, cash flows, and equivalent cash values. 800-825-8763.

CIRCLE 9 ON READER SERVICE CARD

★ KD Systems of Raleigh, N.C., is shipping **ORG'anon**, a $495 program that can print typeset-quality organization charts using employee data from nearly any company database. Using ASCII text files exported from a database, the program automatically generates charts with proportional fonts, multiple type sizes, shading, shadows, and highlighting. 919-847-8838.

CIRCLE 10 ON READER SERVICE CARD

★ **AQS Toolkit,** from AQS of Broomfield, Conn., helps financial advisers answer the complex questions that arise in Keogh and defined contribution plans. The *1-2-3* worksheets and formulas in *Toolkit* observe new regulations and current-year maximums to produce reports for integrated and nonintegrated plans. $95, from AQS. 303-465-4669.

CIRCLE 11 ON READER SERVICE CARD

★ If your company has received a nasty letter from the IRS, consider the newest version of **TaxInterest**, the Time Value Software program that lets tax professionals calculate interest and penalties on tax deficiencies. Version 2.2 incorporates changes made in the Revenue Reconciliation Act of 1990, including the new 2% rule, and allows users to calculate separately interest on both penalties and underpayments. The $149 package can be ordered from the Irvine, Calif., company at 800-426-4741.

CIRCLE 12 ON READER SERVICE CARD

★ Helmsman Corp. has announced **Helmsman**, a corporate planning and consolidation system that integrates data from PCs, minicomputers, and mainframes. *Helmsman* organizes information into structured databases that can be accessed through its spreadsheet-like interface. Site licenses are available. 609-275-9416.

CIRCLE 13 ON READER SERVICE CARD

1-2-3–RELATED

★ Version 2 of Symantec Corp.'s **Sqz!**, a spreadsheet-compression utility, works with *1-2-3* Release 3.1 and a variety of local area networks. The Cupertino, Calif., firm has also included a batch utility with the $99 program. Upgrades are available for $39. 408-253-9600.

CIRCLE 14 ON READER SERVICE CARD

★ National Instruments of Austin, Tex., and D.A. Martin Software of Knoxville, Tenn., have jointly announced the **SPC Orchestra Real-Time Worksheet**. In conjunction with National Instruments' *Measure* instrumentation software and *SPC Orchestra*, the $595 *Real-Time Worksheet* can generate statistical control charts directly from data already stored in the spreadsheet. The instrumentation company can be reached at 512-794-0100.

CIRCLE 15 ON READER SERVICE CARD

★ Sybex of Alameda, Calif., has released **The Personal Tutor for Lotus 1-2-3 Release 2.2**. The multimedia learning system contains a 90-minute videotape, the book *The ABCs of 1-2-3 Release 2.2*, an exercise disk, and a lesson-plan booklet. $69.95. 800-843-8864.

CIRCLE 16 ON READER SERVICE CARD

COMMUNICATIONS

★ Ibis Software of San Francisco has introduced **GoFax**, a program that lets you transmit fax messages with any Hayes-compatible modem. The $69.95 package captures any word-processing, spreadsheet, or graphics file, dials an AT&T service bureau, and transmits the file. 415-546-1917.

CIRCLE 17 ON READER SERVICE CARD

★ SofNet's **XChange Plus** is a communications program designed to simplify the transfer of information between remote locations. In addition to its automated and unattended PC-to-PC file-transfer capability, the program can schedule daily or weekly fax transmissions. A program twin-pack is available from the Marietta, Ga., developer. 404-499-0007.

CIRCLE 18 ON READER SERVICE CARD

The PhaserJet PXi from Tektronix (Wilsonville, Oreg.) is the first plain-paper, color PostScript printer for under $10,000. The $9,995 printer uses proprietary phase-change ink-jet technology to produce 300-dot-per-inch color output on paper stock of up to 12-by-18 inches. 800-835-6100.

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LO7

ESSAY

Is Your PC All That It Can Be?

BY H. G. BISSINGER

ROBERT WISNIEWSKI

In the fall of 1986, a group of managers from several Fortune 500 companies met with a consultant to map out the future of the personal computer. The discussions weren't about meat-and-potatoes computing issues, such as operating systems and applications. Instead, they were about vision, strategy, dramatic restructuring, and trigger events.

The product of these discussions was a 1988 report, partially sponsored by Lotus Development Corp. and published by Nolan, Norton & Co., a Lexington, Mass., consulting firm that is now part of Peat Marwick Main & Co. The report, *Managing Personal Computers in the Large Organization*, boldly stated the need for a new approach to corporate use of technology. It depicted a world in which personal computers would be used not only for preparing reports and spreadsheets but also for making strategic decisions and better serving customers.

The title may be dry, but the report's conclusions were just the opposite. Under the right conditions, it said, companies can get a return on their personal computer investment of not 10%, not 20%, not even 100%, but as much as 1,000%.

This claim of a 1,000% ROI made the report heady stuff. Some executives hailed it as an exciting, plausible model for PC productivity. Others thought it was just another pie-in-the-sky prediction that would only add to the PC's unwarranted reputation as a miracle cure for every business ill.

Whatever the feelings, one thing is clear: Since those discussions four years ago, the revolution in PC productivity is still an event waiting to happen. Yet American businesses continue to buy PCs and software by the truckload. Taking into account such expenses as hardware, software, and training, the average annual cost per PC is $18,000.

Despite such investment, the average productivity growth in the U.S. between 1979 and 1988 was lower than in any other major industrialized nation, according to the U.S. Bureau of Labor Statistics. For example, during that nine-year period U.S. labor productivity grew only 1%, compared with 5.5% in Korea, 3% in Japan, 2% in France, and 1.8% in the United Kingdom.

Clearly, we are not using our PCs as effectively as possible. Only a few companies have successfully linked PCs to such corporate strategies as introducing new products faster, or reducing the time it takes to manufacture existing ones, or using the PC to get closer to customers.

As competition increases, both domestically and internationally, and as productivity decreases, more companies are asking what return they are actually getting from their technology investments. The old productivity-measurement formula—number of products divided by number of labor-hours—doesn't give a true picture anymore. According to an article published in IBM's *Directions* magazine, "Applying traditional cost-accounting formulas to [technology] gains is like trying to measure the volume of water in a teapot with a yardstick—you may get a number, but not necessarily an answer."

PCs are still used predominantly for basic word-processing, spreadsheet, and database applications, which are essentially personal-productivity tools and reflect a tactical rather than a strategic approach to doing business. While some companies use PCs in a more innovative way than others, none of these uses contains the seeds of the dramatic restructuring that management experts say is key to the future success of American business. The Nolan, Norton study and other studies since then have consistently found that to increase productivity substantially, a business must change the way it uses PCs. That, of course, is easier said than done.

"Companies haven't crossed the barrier yet," says David Norton, president of Nolan, Norton. "The barrier is not technological. It's organizational."

The 1980s was an era of growth and learning, says Norton. It takes 10 years to get 10,000 people using PCs comfortably. "The good news is that we have now done that," he says. "The bad news is that we haven't yet created a new organization to take advantage of that investment."

Those that do will reap fantastic rewards. Those that don't, says Norton, "will likely drown."

H. G. Bissinger is a Pulitzer-prize-winning reporter and the author of the best-seller *Friday Night Lights*, published last fall by Addison-Wesley.

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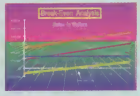

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